Products Finishing

FRED W. VOGEL, Editor

Volume 4 JUNE, 1940 Number 9

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More Than 16,000 Circulation This Issue

DURIRON Equipment

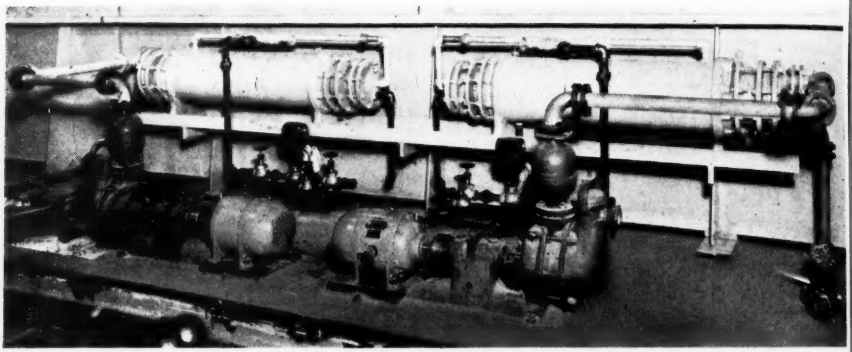
— Corrosion Resisting —

for cleaning and plating..

Pumps and Valves . . . Heat Exchangers
Pipe and Fittings . . . Heating Coils
Tank Outlets . . . Ejectors

Duriron Equipment does not contaminate the solutions handled nor is it affected by them. It is available in sizes adaptable to large or small cleaning and plating operations.

You can cut down your costs . . . of operation, of solutions, of time . . . by installing Duriron Equipment in your plant. Write for Bulletin No. 1601. It has detailed information.



Courtesy Frederic B. Stevens, Inc.

Duriron pumps, valves, heat exchangers, pipe and fittings being installed in a large plant for cleaning operations prior to plating.

You are cordially invited to visit the Duriron Company's plant in Dayton when attending the Electroplaters Convention. Simply phone KEnmore 5161 from your hotel and a car will call for you.

THE DURIRON COMPANY, Inc.

431 N. FINDLAY ST. • DAYTON, OHIO

Products finishing

CINCINNATI, OHIO VOL. 4, NO. 9

JUNE, 1940

A E S CONVENTION

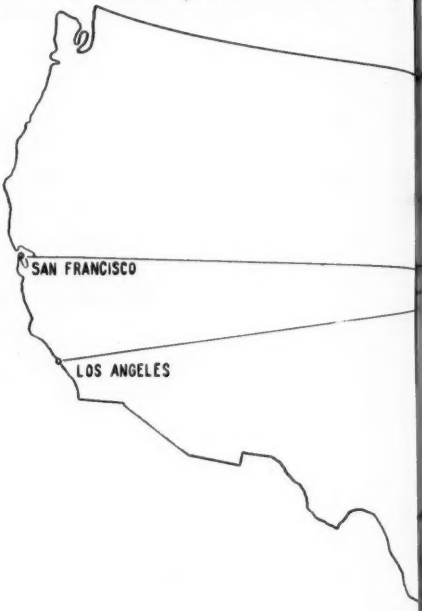
JUNE 10 TO 14 1940

DAYTON WELCOMES A. E. S.

JUDGING from the enthusiasm that is being displayed by members of the Dayton Chapter of the American Electroplaters' Society and from the preparations that are being made, it is evident that the forthcoming Convention of the American Electroplaters' Society to be held at the Biltmore

Hotel, Dayton, Ohio, June 10th to 14th, will be one that will be remembered for many years to come. As a result, the program committee, aided by the national officers and chapters, have developed a program in the course of which the newest developments in the science of electroplating will be presented. The list of speakers includes some of the most outstanding men in the industry. Added to the technical sessions will be plant visitations to at least two of America's largest manufacturing plants.

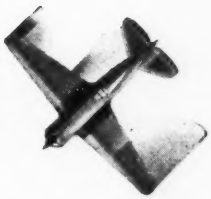
One of the plants to be visited by those attending the Convention is that of the National Cash Register Company. This company has earned for itself an enviable record in industry, not only in the United States but throughout the world as well. The National Cash Register Company was the founder of many of the basic principles employed in present day salesmanship. The fundamental methods of sales technique developed by this company are still being successfully employed at the National Cash Register as well as by many other companies who have adopted the same system.



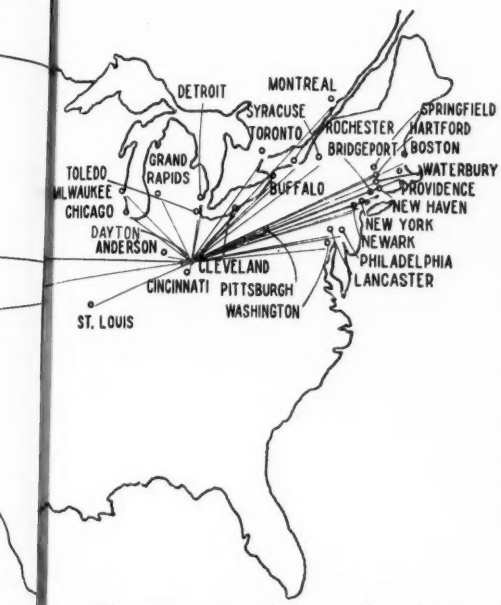
The National Cash Register Company is located on 27 acres of land, part of which is available for expansion. There are 25 buildings, the majority of which are connected by tunnels, bridges or both. There are 60 acres of floor space over which 6,300 employees carry out their daily work. Four-fifths of the factory wall space is glass and thus affords excellent working conditions for the employees.

Another plant on the schedule for visitation is that of the Frigidaire Division of General Motors. At the Frigidaire plant the visitor will see one of the largest

one-story factory buildings in the world. The main building is slightly less than one mile in length. The two plants of the Frigidaire Division located in Dayton employ 13,000 people, and have a combined capacity for producing 2,800 refrigerators per day.



The points of particular interest to visiting electroplaters will be the largest automatic tin plating units in this country, hard chrome plating of compressor parts, automatic pickling of refrigerator cabinets, bonderizing, porcelain enameling, and anodic treatment of aluminum parts.



Registration is the only requirement for admission to the meetings of the Convention for anyone engaged in metal finishing. The registration fee is $5.00 each for both the men and the ladies. Membership in the American Electro-Platers' Society is not a primary requisite in order to be assured a sincere and cordial welcome.

Every plating executive who attends the Dayton Convention at Dayton, Ohio, June 10th to 14th, will benefit by making himself better informed on modern plating practice and thus a more valuable asset to his company.

The International Fellowship Club will, as in previous years, hold its annual meeting on the first day of the convention for the purpose of having lunch together, elect officers for the forthcoming year and discuss the arrangements for the Open House. All suppliers and their representatives and friends are cordially invited to attend this meeting at the Biltmore Room, Monday, June 10th, at 12 o'clock noon.

The ladies of the Dayton Chapter will do everything to make the convention pleasant for the visiting ladies.

CHAS. C. CONLEY
General Chairman,
28th Annual AES Convention

OFFICIAL P

Every effort has been made by the program committee to provide an interesting and well-balanced program.

SUNDAY, JUNE 9th

3:00 P. M. Registration, Ballroom Floor, Hotel Biltmore.

MONDAY, JUNE 10th

8:00 A. M. Registration, Ballroom Floor, Hotel Biltmore.

9:00 A. M. Welcome to delegates, members and visitors.
CHARLES C. CONLEY, General Chairman.

Address—
E. W. COCHRAN, President, Dayton Branch.

Welcome to Dayton—
THE HONORABLE MAYOR CHARLES C. BRENNAN.

Presidential Address—
R. M. GOODSELL, President of American Electroplaters' Society.
Business Session. Presentation of Credentials. General Reports.

2:00 P. M. First Educational Session.

8:30 P. M. International Fellowship Club—Open House, Ballroom, Hotel Biltmore.

This evening's entertainment is sponsored by the International Fellowship Club.

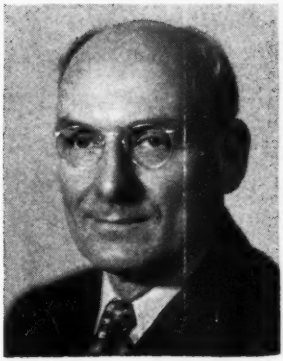
A ticket for this event is included in the registration booklet.

Dancing Refreshments

Music by Michael Hauer and His Orchestra

L PROGRAM

In order to maintain the schedule, all activities will begin at the hours designated in this program.



R. M. GOODSELL
President, American
Electroplaters' Society

TUESDAY, JUNE 11th

8:45 A. M. Second Educational Session.

1:00 P. M. Trip through the National Cash Register Company.
(Buses leave Hotel Biltmore at 1 P. M.)

3:30 P. M. Trip through the Frigidaire Division of General Motors.
(Buses leave National Cash Register Company at 3:30 P. M.)

8:00 P. M. Third Educational Session.

WEDNESDAY, JUNE 12th

8:45 A. M. Fourth Educational Session.

11:00 A. M. Buses leave Hotel Biltmore for Springfield, Ohio, visit to Mitchell Engineering Company Branch of F. B. Stevens Company for inspection of latest type automatic plating equipment in operation.
(Buses leave Mitchell Engineering Plant for Springfield Country Club.)

Luncheon Refreshments
East and West Ball Game
Golf Tournament Swimming Dancing

Tickets for these activities are included in the registration booklet.

6:00 P. M. Final bus leaves Country Club for Dayton.

8:00 P. M. Fifth Educational Session.

9:00 A. M. Sixth Educational Session.

THURSDAY, JUNE 13th

1:30 P. M. Final Business Session, fourth floor (small ballroom).
Election of Officers.
Selection of 1941 Convention City.

7:30 P. M. Banquet and Dance, Ballroom, Biltmore Hotel. Entertainment.

LADIES' PROGRAM

SUNDAY, JUNE 9th

3:00 P. M. Registration.

MONDAY, JUNE 10th

8:00 A. M. Registration.
9:00 A. M. Attend opening of Convention with men.
1:30 P. M. Bridge Luncheon with Fashion Show at Rike Kumler Company.
8:30 P. M. International Fellowship Club Party in Biltmore Hotel Ballroom.

Air view of the National Cash Register Company plant located in Dayton, Ohio.

Air view of the Frigidaire Division of General Motors plant located in Dayton, Ohio.

TUESDAY, JUNE 11th

9:30 A. M. Breakfast and Gift Presentation in Kittyhawk Room, Biltmore Hotel.

2:00 P. M. Tour through the National Cash Register Co.
Organ recital.
(Buses leave Biltmore Hotel at 2 P. M.)

WEDNESDAY, JUNE 12th

12:00 Noon Luncheon, Bingo Party, Swimming and Golf at Springfield Country Club.
(Buses leave Biltmore Hotel at 10:30 A. M.)

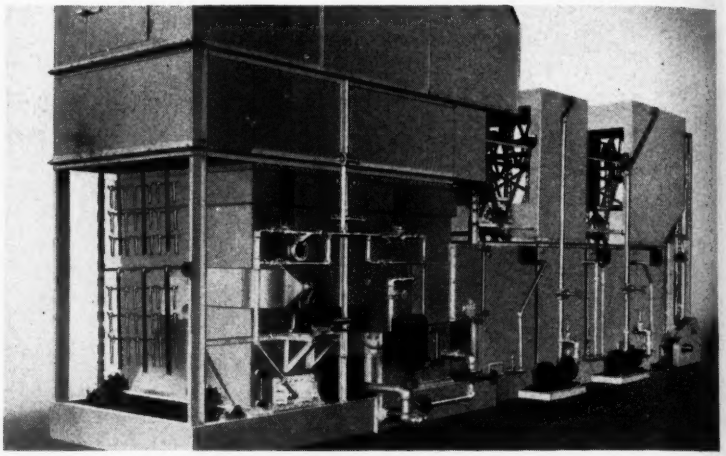
8:00 P. M. Aunt Emma's Party and Special Entertainment at Biltmore Hotel.

THURSDAY, JUNE 13th

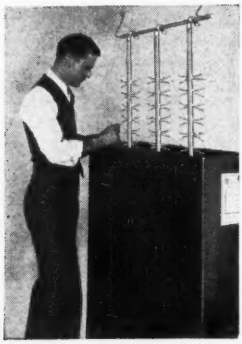
10:00 A. M. Tour through Dayton Art Institute.
(Buses leave Biltmore Hotel at 10 A. M.)

7:30 P. M. Annual Banquet, Entertainment and Dancing, in Biltmore Hotel Ballroom.

Protective Coatings That
Through DEGREASING, CLEANING



Photograph Courtesy of Detroit Rex Products Company



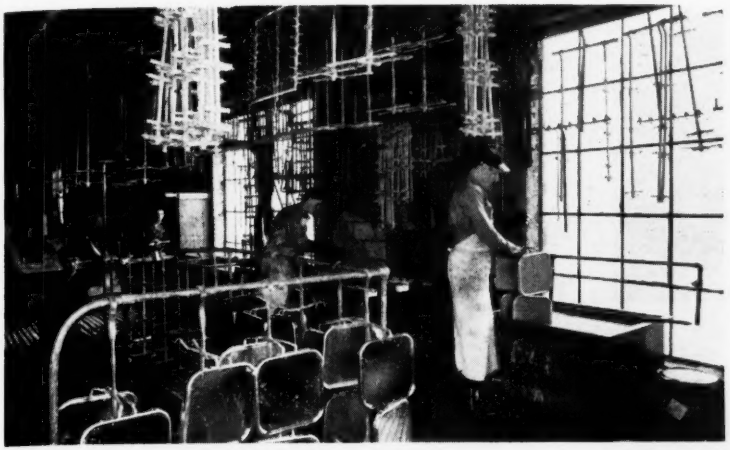
Laboratory and field tests, made with Miccro Supreme Stop-Off Lacquer GB-201, were completed recently by the Detroit Rex Products Company, manufacturers of the well-known Detrex Degreasers. The results proved that this coating material eliminates all re-racking operations between degreasing, acid dip, alkali cleaning and plating, as have been customary in the past.

Racks run through equipment such as the complete Detrex cleaning installation shown above—which removes oil and grease, solid contamination and oxides from base metal prior to plating—are thoroughly protected through *every* operation. This particular machine includes vapor-spray-vapor degreaser, alkali dip, rinse, cyanide dip and rinse. From this equipment, the racks go directly into the plating cycle without re-racking any of the work.

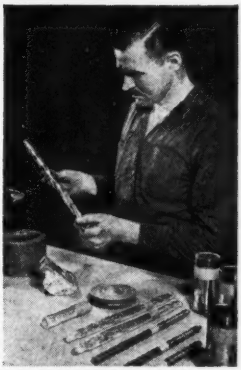
Miccro Supreme STOP-OFF LACQUERS

Developed and Manufactured by Experienced Platers

Eliminate Re-racking Work and COMPLETE PLATING CYCLE



Miccro Supreme Stop-Off Lacquers and Miccrolite—the coating material made especially for fast dipping and air-drying—reduce your protective coating costs to a minimum. Smooth, uniform coatings can be applied quickly and easily right in your own plant. If racks are damaged in process, repairs can be made immediately on the damaged section alone—the patch becoming an integral part of the entire coating. Using either of these materials, the coating cost per rack is almost negligible.



MASKING PARTS TO BE HARD CHROMIUM PLATED

Miccro Supreme Stop-Off Lacquers, made for masking parts for hard chromium plating, have exceptional adhesive qualities . . . air-dry rapidly . . . can be trimmed cleanly and sharply . . . and, being absolutely neutral, do not etch precision lapped or super-finished machine parts.

AND MICCROLITE

MICHIGAN CHROME COMPANY
6342 East Jefferson Avenue • Detroit, Michigan

EDUCATIONAL PROGRAM FOR 19

FIRST SESSION

Monday Afternoon, June 10, 2:00 P. M.

Biltmore Hotel Ballroom

VICTOR MINER, Toledo Branch, Presiding

V. Miner

1—"Metallurgical Aspects of Hydrogen in Electroplating."

By CARL A. ZAPFFE, Research Associate, and C. L. FAUST, Research Engineer, Battelle Memorial Institute, Columbus, Ohio.

C. A. Zapffe

2—"Notes on the Spot Test for Thickness of Chromium Coatings."

By DR. WM. BLUM and W. A. OLSON, National Bureau of Standards.

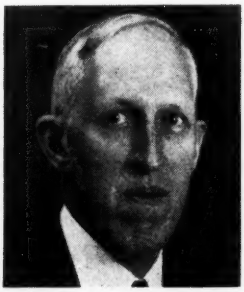
3—"Magnesium as a Control Agent for Zinc Anodes."

By R. O. HULL, DuPont Electroplating Division, Experimental Laboratory, Cleveland, Ohio.

4—"Patents in the Plating Industry."

By Col. W. A. TOULMIN, JR., Toulmin & Toulmin, Attorneys, Dayton, Ohio.

C. L. Faust



W. Blum

W. A. Olson

1940 A. E. S. CONVENTION

SECOND SESSION

Tuesday Morning, June 11, 8:45 A. M.

LEROY CRITCHFIELD, Lancaster Branch, Presiding

1—"The Trends of Electroplating."

By GEORGE B. HOGABOOM, Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

2—"Disposal of Plating Room Wastes."

By T. J. FADGEN, Process Engineer, Ternstedt Trenton Division, General Motors Corporation, Trenton, New Jersey.

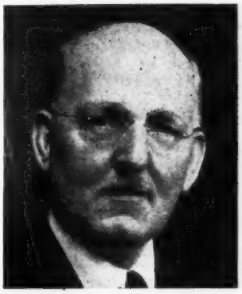
3—"Treatment of Steel Prior to Organic Paint Finish."

By S. J. COLVIN, Parker Rust-Proof Co., Detroit, Michigan.

4—"Magnesium Copper Sulphide Rectoplaters as a Source of Direct Current Power for Electroplating."

By C. A. KOTTERMAN and W. BINAI, P. R. Mallory & Company, Indianapolis, Indiana.

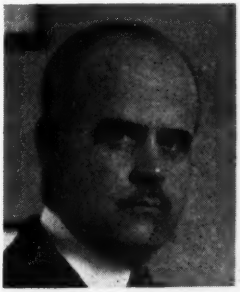
L. Critchfield



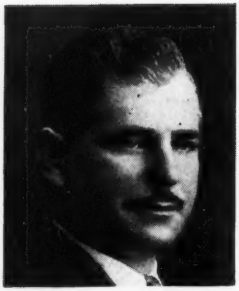
G. B. Hogaboom

T. J. Fadgen

R. O. Hull



H. A. Toulmin, Jr.



G. Wagner

THIRD SESSION

Tuesday Evening, June 11, 8:00 P. M.

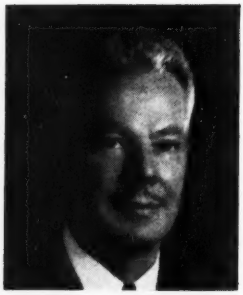
GEORGE WAGNER, Newark Branch, Presiding

1—"Chemical Evaluation and Control in Metal Cleaning."

By JAY C. HARRIS, Thomas & Hochwalt Laboratories Division, Monsanto Chemical Co., Dayton, Ohio.

2—"Effect of Cleaning Technique on Adhesion of Electroplates."

By B. F. LEWIS, Northwest Chemical Co., Detroit, Michigan.



C. A. Kotterman

3—"Absorption of Copper in Zinc Base Die Castings."

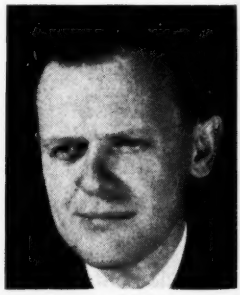
By F. F. OPLINGER, Dupont Electroplating Division, Niagara Falls Laboratory.

4—"Pickling of Metals for Electroplating."

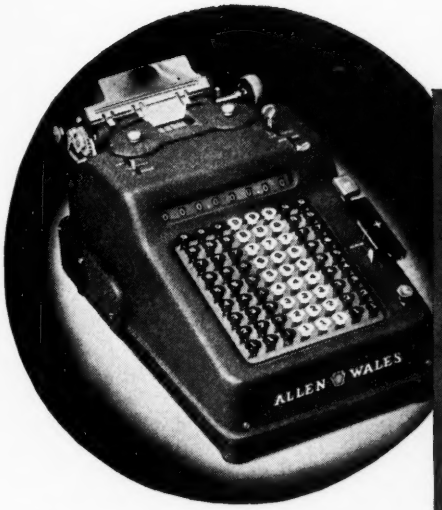
By OWEN T. TOWNER, Cincinnati Branch, Superintendent of Finishing, Auto Sun Products Co., Cincinnati, Ohio.

W. Binai

B. F. Lewis



J. C. Harris



PENNSALT CLEANER cuts metal cleaning cost 60% for Allen Wales Adding Machine Corporation

ALLEN WALES Adding Machines are precision instruments. In their manufacture, the cleaning of metal parts, such as springs, bearings, key arms, and others must be perfectly done if accuracy and excellence of finish are to be maintained through the finishing operations.

One of the Pennsalt Cleaners was selected after it proved its exceptional efficiency in removing grease and oil, and in preparing the surfaces for plating. Outstanding economies resulted. Cleaning time is cut in half through the elimination of a pre-cleaning operation, and cleaning costs reduced approximately 60%. The cleaning solution is dumped only about every 100 days, showing the long lasting power of Pennsalt Cleaners in *electrolytic* cleaning.

Orthosil — the original Pennsalt Cleaner — quickly earned an important place in heavy duty metal cleaning. Companion cleaners have been developed for varied and extreme requirements. They are known as the Pennsalt Cleaners.

They all have unusual dissolving and emulsifying action, and enormous lasting power. Why not let one or more of them start saving money in your processes? Write Dept. F and we will gladly supply full details. Pennsalt Cleaner Division, Pennsylvania Salt Mfg. Co., Phila., Pa.

Other Pennsylvania Salt Chemical Products used in large quantity by industry

Anhydrous Ferric Chloride • Sal Ammoniac • Carbon Tetrachloride • Soda Ash • Mineral Acids • Caustic Soda • Kryolith • Acid-Proof Cements

PENNSALT

CLEANERS FOR INDUSTRY

PENNSYLVANIA SALT

MANUFACTURING COMPANY

Chemicals

P. J. Ritzenthaler

FOURTH SESSION

Wednesday Morning, June 12, 8:45 A.M.

PHILIP J. RITZENTHALER, Milwaukee Branch
Presiding

1—"The Effect of Cathodic Film Motion on Electrodeposits."

By W. M. PHILLIPS, Head Electro-Chemistry Department, Research Laboratories Division, General Motors Corporation, Detroit, Mich.

W. M. Phillips

2—"A New Method for Studying Cathode Films."

By A. BRENNER, National Bureau of Standards.

3—"Plating Silver at Very High Current Densities."

By A. C. SIMON and J. T. LUMLEY, National Bureau of Standards.

4—"Plating Shop Economics."

By DR. M. M. BECKWITH, The J. B. Ford Sales Co., Wyandotte, Michigan.

F. F. Oplinger

O. T. Towner

A. Brenner

Is It Blue Monday Every Day In Your Plant?

Washing metal parts by old fashioned hand methods, or with old fashioned machines that are not part of your modern production line is enough to make every day a Blue Monday.

Ransohoff has designed new cleaning methods and new modern production type, metal cleaning machines that fit into and coordinate with straight line production and banish the Blues because they speed production and reduce costs.

Send for a Ransohoff Engineer to tell you about the new low cost standard machines, and the special designs for special applications, or write for our new catalogue.

WRITE FOR CATALOG

N. RANSOHOFF, INC.
212 W. 71st Street
Cincinnati, Ohio

S. Hedden

FIFTH SESSION

Wednesday Evening, June 12, 8:00 P.M.

STANLEY HEDDEN, Pittsburgh Branch, Presiding

1—"The Cathodic Treatment of Copper in Solutions of Beryllium Sulphates to Prevent Tarnish."

By DR. D. T. EWING and GEORGE JERNSTEDT, Michigan State College.

J. T. Lumley

2—"Study of Sodium Stannate Tin Plating Solutions."

By FRED BAUCH, Frigidaire Division of General Motors, Dayton, Ohio.

3—"Lead Plating in Lead Acetate Baths."

By DR. F. C. MATHERS and J. SCHWARTZKOPF, Indiana University, Bloomington, Ind.

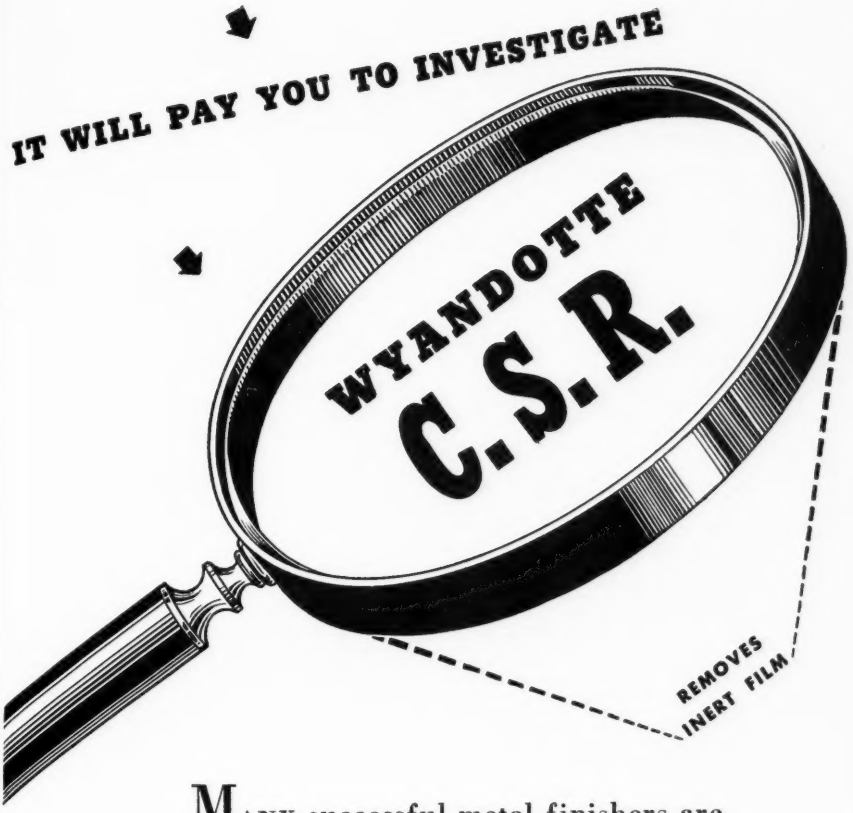
4—"Studies in Bright Nickel Plating Processes."

By Dr. C. B. F. YOUNG, Electrometallurgist, Columbia University, New York, New York.

M. M. Beckwith

F. Bauch

G. Jernstedt



MANY successful metal finishers are discovering that Wyandotte C. S. R. cleaner is unsurpassed for the removal of inert film from steel before bright nickel plating.

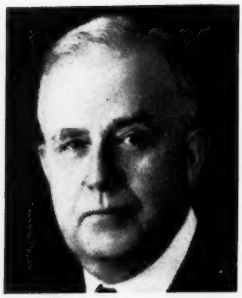
The price for this fine cleaner is low . . . the cost of operation is *exceptionally* low.

Wyandotte

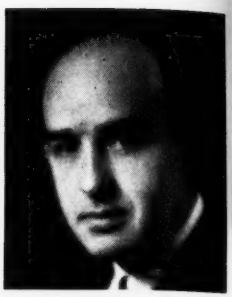
SERVICE REPRESENTATIVES IN 88 CITIES

THE J·B·FORD SALES CO· WYANDOTTE MICH·

R. Knoepfler



F. C. Mathers



W. L. Pinner

SIXTH SESSION

Thursday Morning, June 13, 9:00 A.M.

ROBERT KNOEPFLER, Cincinnati Branch, Presiding

1—"A Short Research on the Effect of Basis Metal Polishing on the Character of Nickel Plate."

By WALTER L. PINNER, General Spring Bumper Division, Houdaille-Hershey Corporation, Detroit, Michigan.

2—"The Relative Effect of Various Polishing Finishes on Corrosion Resistance of Electroplated Nickel Deposits on Steel."

By THE TOLEDO BRANCH.

3—"Hard Plating of Plastic Molds."

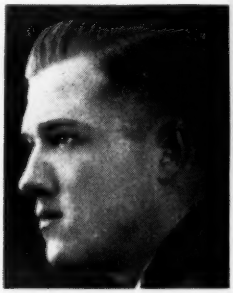
By ARTHUR W. LOGOZZO, Spring Branch, Foreman Plater of the Plastics Division, General Electric Company, Pittsfield, Massachusetts.

4—"New Equipment for Treating Parts in Bulk."

By GUSTAF SODERBERG, The Udylite Corporation, Detroit, Michigan.

A. W. Logozzo

C. B. F. Young



J. B. Schwartzkoff

A COMPLETE PICTURE STORY OF THE ROTO-CLONE

SEND FOR YOUR COPY!

We have prepared a story, in many pictures and a few words, on the application of the Roto-Clone Dynamic Precipitator to dust problems.

Eighty illustrations show its use in the collection of practically every type of industrial process dust and the means of eliminating dust hazards easily and economically.

For convenience, use the coupon!

AMERICAN AIR FILTER CO., INC.
701 Central Avenue, Louisville, Ky.

Please send me your latest bulletin—
"Roto-Clone Dust Control."

Name.....

Company.....

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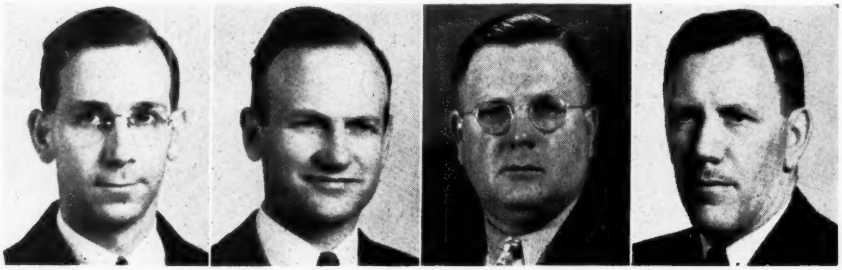
GREETING you from this page are the committee chairmen of the 1940 Convention Committee of the American Electroplaters' Society. In assuming the responsibility for the success of the 1940 Convention, these members have been fully aware that the electroplating industry is passing through its greatest development and it is with this fact in mind that they have made every effort to obtain speakers who are qualified to give those who attend the convention authentic facts and figures concerning subjects of prime importance to the industry as a whole and to the individual electroplater in particular.

To these members, also, should be given credit for the monumental task of arranging for the display of the exhibits, plant visitations, banquet and entertainment, and all of the other details which were involved in the management of a National Convention.

The members of the Dayton Chapter who assisted the chairmen shown on this page are as follows:



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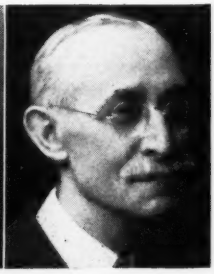

W. Fraine

CADMIUM PLATING WITH AUTOMATIC EQUIPMENT

By A. W. Steinberger
Plant Engineer

WHEN a leading manufacturer of radio tuning condensers decided to install equipment for cadmium plating, a careful survey was made of the various processes available preliminary to selecting the type of equipment which would best be suited to his needs. Primary considerations were: 1. Protection against corrosion of the steel parts to be finished; 2. Appearance, a uniform bright surface being required; 3. Ease of soldering; 4. Time required for plating; 5. Labor required; 6. Floor space needed; 7. Cost of operations. After studying the features of the various processes, the Cadalyte process was selected as most nearly meeting the requirements of this particular job.

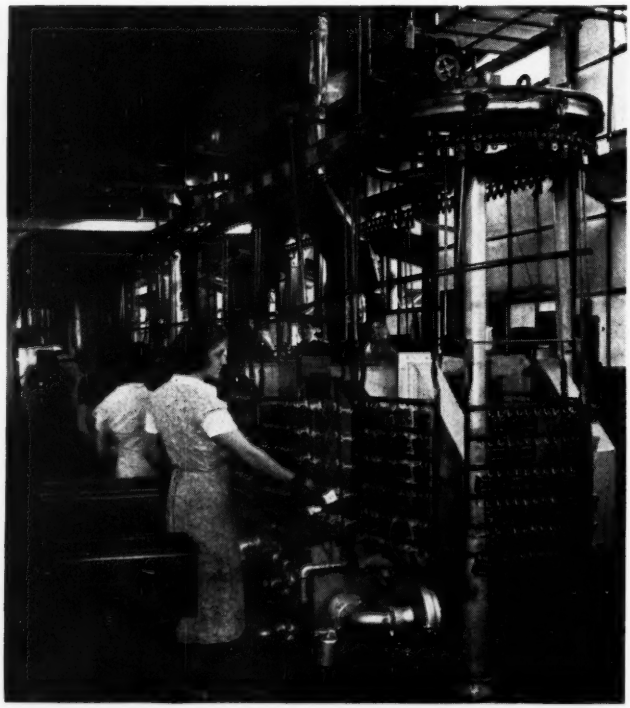

Fig. 1 — Illustration showing operators racking workpieces prior to the washing operation.

The installation consists of a Meaker full automatic plating machine, two Lasalco plating barrels, and one miniature plating barrel which was manufactured by the firm's maintenance depart-

ment. The articles plated by means of the full automatic unit consist of many kinds and sizes of cold rolled steel stampings as well as assemblies composed of stampings and screw machine parts, the largest piece being approximately 4 in. by 4 in. by 7 in. in size. The two 12 in. by 42 in. plating barrels each containing 245 gal. of solution are used for the plating of a great variety of parts ranging from readily plated steel screw machine parts to intricate steel stampings and flat pieces which offer interesting problems to the plater.

The work processed by means of the automatic unit is delivered to the plating department in tote boxes, barrels, and bin trucks from the press room, cradle assembly department, tapping department, and so on. Inasmuch as no pre-cleaning operations are performed before the parts reach the plating department, they are saturated with lubricants such as sulphur cutting oil, water soluble oil, machine oil, or lard oil. After the parts reach the plating department they are racked by the operators shown in Fig. 1. The number of pieces per rack ranges from 8 to 30, depending upon the size of the piece and the type of rack being used. All racks are insulated with either hard rubber or Korolac.

The loaded racks are hung on the monorail chain conveyor which passes in front of the racking operators. This same conveyor carries the racked parts through the tunnel type Industrial power washing machine shown in the illustration Fig. 2. This machine has a tank capacity of 430 gal. and is charged with a solution of 3 oz. per gal. of Oakite No. 30 cleaning compound. A five h.p. motor driven pump supplies the spray nozzles of the cleaning unit with approximately 400 gal. of solution per minute. From the washing machine,

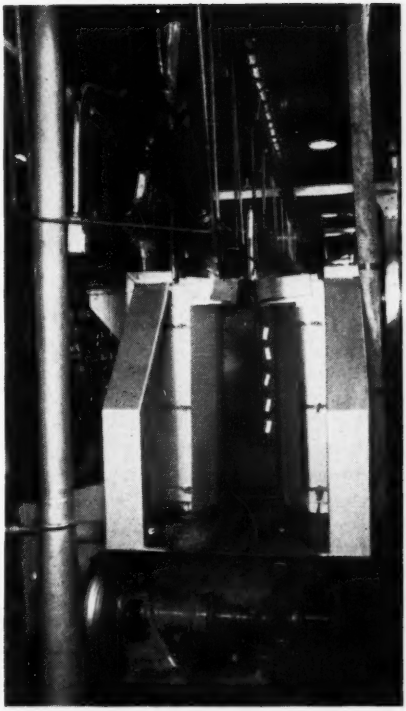

Fig. 2—An end view of a tunnel type Industrial washing machine.

the conveyor transports the racked work to the loading station of the Meaker plating machine, a view of which is shown in Fig. 3. At this point, the operator transfers the racked work from the overhead conveyor to the carrier cross bars of the plating unit. The conveyor mechanism of the automatic plating unit transfers the racked work through the sequence of operations shown in the chart which is designated as Fig. 4.

Hot air drying is the last in the sequence of operations of the automatic unit. Upon emerging from the hot air dryer, the racked work is removed from the plating machine carriers by an operator who dumps the

Fig. 3 — After the workpieces are washed, they are transferred by means of an overhead conveyor to the automatic plating machine shown in this illustration.

parts into containers and hangs the empty racks on an auxiliary conveyor which transports them to the racking operators. Finished work is delivered to the inspection department for visual inspection of both plating and workmanship in fabrication.

The production capacity of the automatic machine with average types of work operating with a chain speed of 42 in. per minute is approximately 3,500 assemblies per hour. The average thickness of the deposit is two ten-thousandths of an inch. This is checked by measuring the thickness of an occasional piece before and after plating. The tanks containing hot solutions are heated with steam at 125 lbs. pressure. Closed steam coils, controlled by thermostatic valves, maintain correct temperatures. The steel coil in the acid tank is covered with lead jacket burned on.

The cadmium tank is equipped with a motor driven agitator which aids in both preventing stratafication of the solution and in mixing additions to the chemical contents. A portable filter of 700 gallons per hour capacity is employed for the purpose of maintaining the solutions free of sediment and foreign material.

Three generators are included in the setup. The electric cleaning generator, which also energizes the plating barrels, has a capacity of 1,500 amperes at 6 volts while the plating generator has a capacity of 2,000 amperes. Both are Electric Products ball bearing twin commutator machines driven by integral syncronous motors. The frames are of welded steel construction and the design is modern throughout. The control panels are equipped with push button starters, field rheostats, exciter switches, excitation ammeters, output volt meters and ammeters.

The third generator has a capacity of 500 amperes at 6 volts and is used to energize the electric cyanide tank. This is a twin commutator self-excited machine driven by a separate 5 h.p. induction motor. The control panel is equipped with a push button starter, field rheostat, output volt meter and ammeter. All of the generators are mounted on an overhead structural steel framework, due to the limited space available the floor beneath needed for production purposes. A steel partition separates the generator installation from the plating room proper.

The use of a wetting agent known as DuPont's Neonerpin "N" greatly increases the activity of the acid in

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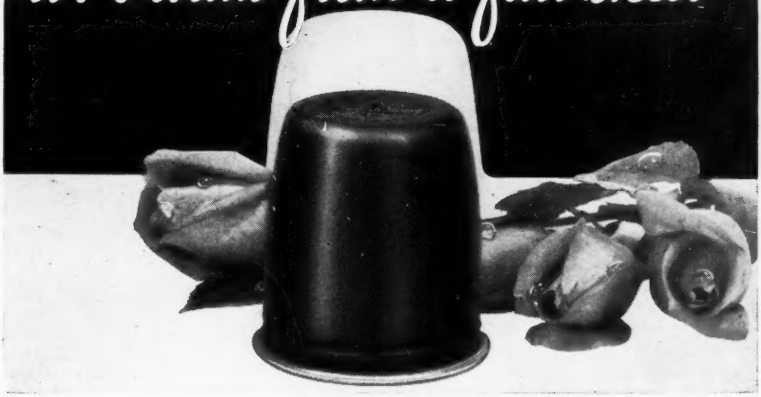
a 1 5/8" draw from a flat sheet



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Operation	Time	Solution	Temp.	Capacity	Tank Construction	Electrification
1. Electric cleaner	1½ min.	8 oz. per gal. Oakite "A" spec.	200 deg. F.	422 gal.	Steel	Reverse current 7V-50ASF
2. Warm water rinse	18 sec.	.....	120 deg. F.	236 gal.	Steel	.....
3. Hot acid	1½ min.	20 per cent by volume 66 deg. sulphuric	150 deg. F.	422 gal.	Steel—rubber lined	.....
4. Cold rinse	15 sec.	.....	Room	236 gal.	Steel—rubber lined	.....
5. Electric cyanide	1 min.	5 oz. per gal. sodium cyanide	Room	390 gal.	Steel	Reverse current 7.5V-20ASF
6. Cadmium plate	6 min.	1½ lbs. Cadalyte salts per gallon	Room	1,600 gal.	Steel	Direct current 3.75V-25ASF
7. Water spray	15 sec.	.....	.....	.....	Steel	.....
8. Bright dip	15 sec.	15 gal. Cadalyte bright dip	Room	236 gal.	Steel—rubber lined	.....
9. Water spray	1 min.	.....	.....	390 gal.	Steel	.....
10. Hot water rinse	1½ min.	.....	180 deg. F.	422 gal.	Steel	.....
11. Automatic air blast	9 sec.	.....	.....	.....	.....	.....
12. Hot air dryer	1½ min.	.....	200 deg. F.	.....	.....	.....

All of the time intervals given are based on a chain speed of 27 in. per min. The present operating speed is 42 in. per min. with consequent decrease in the time intervals.

Fig. 4—Chart showing the sequence of operations through which the workpieces pass in the automatic plating unit.

the automatic plating machine. This material also reduces fuming, thereby improving working conditions in the plating room and minimizing corrosion of mechanical parts.

The barrel section of the finishing department, a view of which is shown in Fig. 5, has been equipped and arranged to obtain the maximum production in the minimum of space. Lost motion and idle time of equipment has been reduced to a minimum in order to produce 4,000 to 5,000 lbs. of work in 13 hours. If all work processed were of the nature of screw machine parts, this figure could be increased by at least 45 per cent. Approximately 75 per cent of the loads, however, consist of irregularly shaped stampings.

The equipment is arranged on either side of a 4-foot aisle. On the

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outside are placed the solvent tank, two compartment alkali cleaning tanks, cleaning tumbler, two compartment rinse tanks and wood strip tank. The latter is used for removing cadmium deposits from the hooks of the plating racks used on the Meaker Plating Machine. On the other side of the aisle are arranged a stand upon which a spare barrel cylinder rests the two plating barrels with their long side adjacent, three 245-gallon hopper rinse tanks and a Kreider centrifugal dryer equipped with a hot air blower. The miniature plating barrel stands in one corner.

A mono-rail track, extending over this row of equipment, is provided with an electric hoist and a chain hoist. The electric hoist is used for handling the plating barrel cylinders and the chain hoist for dumping the hoppers one into the other. A spare cylinder is available for the purpose of cutting down idle time of the plating barrels. This cylinder can be loaded and made ready while the two other cylinders are plating their loads. It is a matter of moments, therefore, to lift a cylinder from its tank, place it on the frame over the first hopper rinse, and then place the spare cylinder with its load in the tank thus vacated.

Each plating barrel is equipped with an ammeter which reads to 500 amperes. The normal barrel operation sequence involves a transfer of the work from the tote pans to perforated brass baskets 10 in. by 10 in. inside, then dipping in Stoddard safety solvent for about two minutes. After draining off the surplus solvent, the baskets are placed in an 80-gallon tank containing a solution of 10 oz. per gal Oakite No. 19 at 200 deg. F. This tank holds four baskets suspended on hooks. After about seven minutes, the baskets are transferred to a similar tank containing 8 oz. per gal. of Oakite "A" special at a temperature of 200 deg. F. Flat pieces which are more difficult to clean are placed in a motor-driven tumbler instead of the second alkali tank. A pail or two of the solution from tank No. 2 is used for cleaning in this case. Following the cleaning, the work is rinsed in two cold water baths and transferred to a 40 per cent solution of cold muriatic acid for about one minute. After two cold water rinses, the work is immersed in a solution of 5 oz. per gal. sodium cyanide for about 1 minute, rinsed again and placed in the spare plating cylinder.

The operations are so timed that at this point, one of the plating barrels is ready for unloading. The

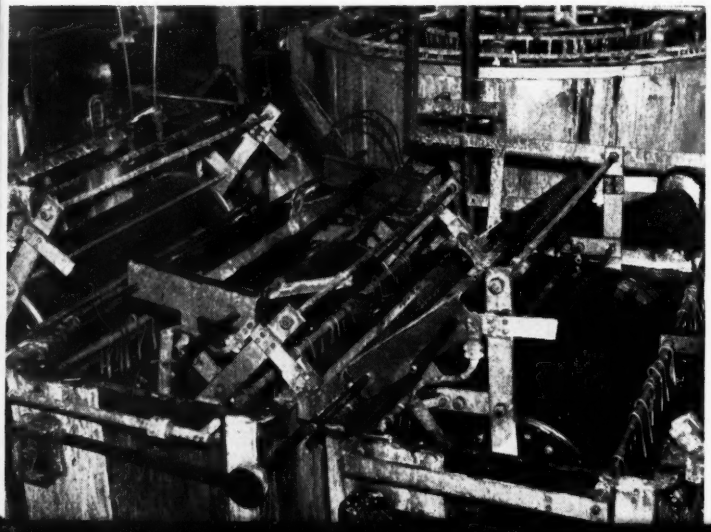
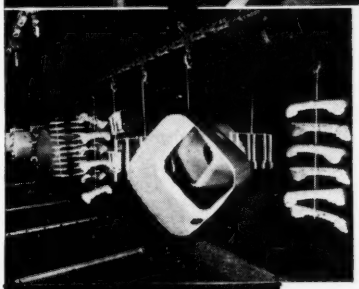


Fig. 5 — A view of several barrels in the barrel plating department.

Another Complete Mahon FINISHING SYSTEM



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cylinder to be unloaded is lifted from the tank by means of the electric hoist and placed on a frame mounted over the first hopper rinse tank. The hoist is then run on its track to the spare cylinder which is loaded and ready and deposits the same in the tank just vacated. In the meantime, another operator has unloaded the cylinder which was removed from the tank by dumping the load into the hopper submerged in the rinse tank. The empty cylinder is then moved by the hoist operator to the loading stand. The plated work is dumped from one tilting hopper to the other by means of the hand hoist and directly into the baskets of the centrifugal dryer. Some parts which do not require a bright dip are immediately dryed. Where it is necessary to brighten parts, the loaded dryer basket is dipped into a solution of one part of cadalyte bright dip in 30 parts of water for about 15 seconds. After rinsing, the basket is returned to the dryer. By the use of two baskets, the idle time is reduced on this piece of equipment.

The actual plating time in the barrels ranges from two minutes to fifteen minutes, depending upon the thickness of plating required and the nature of the load. All solutions are analyzed at regular intervals and the required additions made to maintain uniform results. Grasselli total sodium cyanide and cadmium test sets provide a simple and direct reading means of checking the plating solutions and cyanide baths. A similar test set enables the acid and iron contents of the acid tanks to be closely controlled.

The Oakite cleaning solutions are checked by means of a simple but complete titrating outfit supplied by the makers of these compounds.

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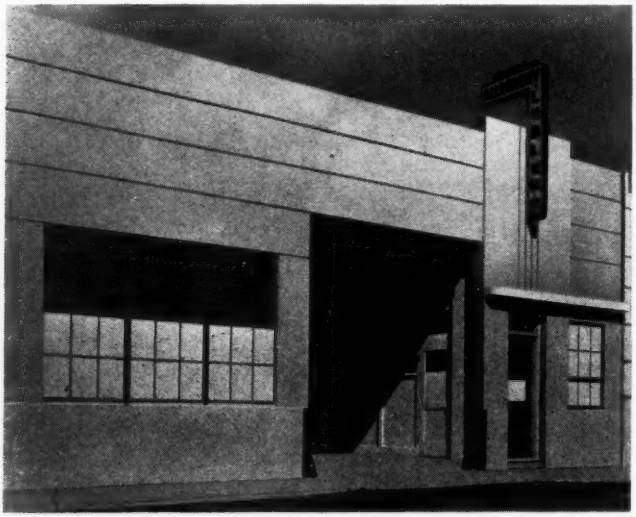

All polished steel delivered from the Allegheny Ludlum Steel Corporation's warehouse at 36 Berry St., San Francisco, Calif., is packed in special-made canvas bags. Among other features of the new warehouse is the large space provided for ample stocks of steels used by fabricators on the Pacific Coast. The insides of the racks are equipped with wood skids to prevent scratching polished bars when loading or unloading.

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BARREL FINISHING OF METAL PRODUCTS

Soap and its relation to Hard Water in Barrel Finishing Operations.

By H. LEROY BEAVER

FOR our present discussion it is necessary to turn back the page about forty-five years, fifteen years before the author of this series became interested in barrel finishing procedure, and to locate the beginning of a cycle of practice at Union City on the Naugutuck in Connecticut. This marks the beginning of the factor (2) that has been religiously followed, right or wrong, down through the years, as we shall attempt to describe.

Somewhere about this time one Charles Aiken brought from England a method of handling brass parts in process, wherein a pan holding two gallons of water was used, and in this water was placed two ounces of cream of tartar to prevent oxidation of the parts following an operation known then, as now, as an "ashing" process. The parts being ashed on a wheel with pumice and water were tossed into this pan of solution until a sufficient quantity had accumulated to carry them to a succeeding stage in the finishing process. From this, we suppose it was only natural for someone to conceive the idea of operating brass parts in a barrel, and as the story comes to us, the same solution of 2 ounces of cream of tartar to two gallons of water was used, and the load was proportioned so that the water used, covered the parts to be finished to a depth of two inches.

At first, only the cream of tartar was used, but then followed another cycle in which two ounces of Peruvian soap tree bark was added to the cream of tartar solution. Following this, and when barrel finishing procedure involved the use of steel balls and soap water solution, it becomes fairly clear that the procedures used in the previous cream of tartar operations were in a sense automatically and without any great deal of reason, carried into the barrel finishing procedure. We find that the general recommendation by barrel manufacturers, even to the present time, follows this rule of two, because almost invariably it is recommended that the mass of burnishing material and work should be covered to a depth of two inches with water and then two ounces of soap powder or chips be added for each barrel load of work. Further than this, it is remarkable that so many operations are sug-

gested as being in the general cycle of two hours.

The blind following of such a cycle operating around the factor of two parts of this to one of that was followed by the recommendation that two parts of burnishing material should be used to each part of the work to be finished. It is doubtful whether in all the history of metal finishing, whatever the operation might be, could we find a more apt illustration of the fallacy of reasoning in a circle than is presented by this same rule of two as it has been developed in barrel finishing procedure.

For our present discussion, we are taking the factor of the almost generally recommended rule to use two ounces of soap to each barrel load of work and are trying to point out in what respects this rule is entirely unapplicable to barrel finishing procedure. Soap in barrel finishing has one principal function, and that is to act as a lubricant. We hear many barrel operators speak of using what they term a "neutral soap," but when you ask them what should be pH of a soap considered to be neutral, they are at a loss to explain, but it certainly is not the pH 7 which we speak of so often as being "neutral" in plating procedure. A neutral soap is one in which a sufficient amount of alkali is used to convert greases or oils into the desired soap, and where no excess alkali is present. Such a soap, even when considered as being a neutral soap, will have a normal pH of from 10.3 to 11.

Neutral soaps, so-called, will function in water that is soft, such as rain water or distilled water, but in the very great majority of cases where barrel finishing is practiced, such water is not available, and we have water to work with that is

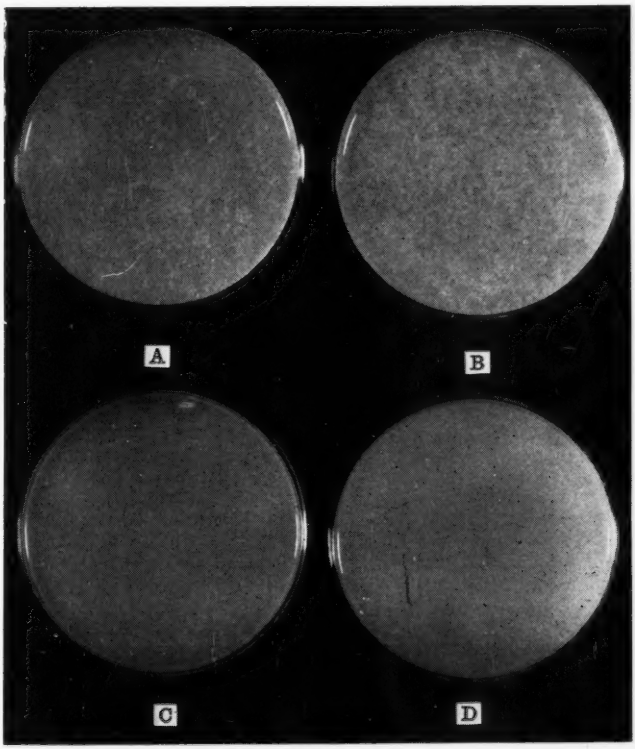

Fig. 1 — Illustration showing the effects of ordinary soaps in water without alkaline builders (above) and water containing alkaline builders (below).

more or less hard, depending on the section of the country from which the water supply is derived or used. It is not at all unusual to find water varying anywhere from five grains to twenty-five grains hard per U. S. Gallon in use quite generally in industry. In some cases, the problem of hard water is sufficiently understood and the necessity for controlling it is clear, but in more cases, practically no attention is paid to water condition, and it is from those cases where the most of our complaints of poor results from barrel finishing procedure arises.

Practically every soap peddler has the "best" barrel finishing soap ever produced, but in the main and especially when in chip form, they turn out to be simply tallow base soap flakes with a titer of 42 or 43. Now the information we are about to write, we want the reader of this series to study and consider very carefully because it is one of the most important points thus far discussed in the entire series, and here it is: Any soap chemist worthy of the title, will tell you that of the average tallow base soaps as just above described, it requires two (2) ounces of soap to reduce each grain of hardness per one hundred gallons of water. We want you to go with us say to Toledo, Ohio, where in early March the water tested 16 grains hard per U. S. Gallon, and let us take a high and narrow type burnishing barrel and add what is generally considered to be a normal charge of water, which we will find to be approximately ten gallons.

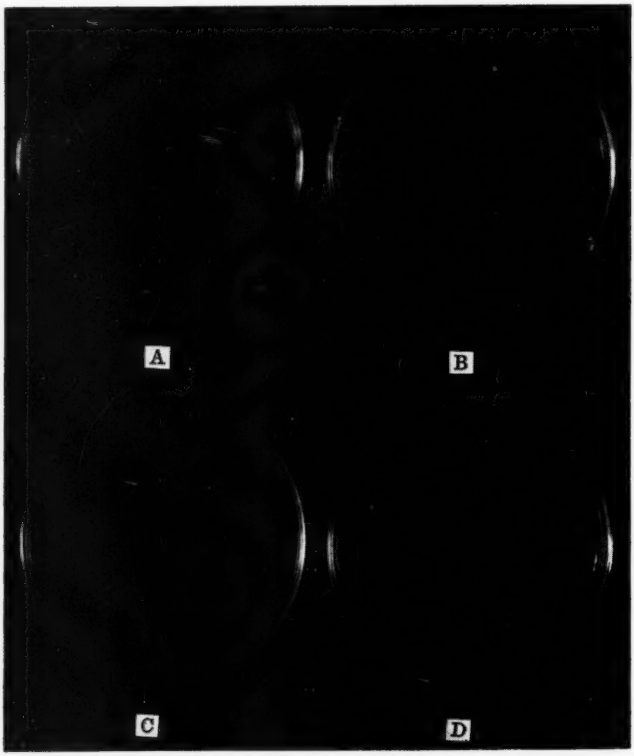

Fig. 2 — Illustration showing the same laboratory glass disc as used in Fig. 1 after rinsing.

If it requires 2 ounces of soap to reduce one grain of hardness, then for sixteen grains of hardness we would require thirty-two ounces of soap for one hundred gallons of water. Of the ten gallons charge in the

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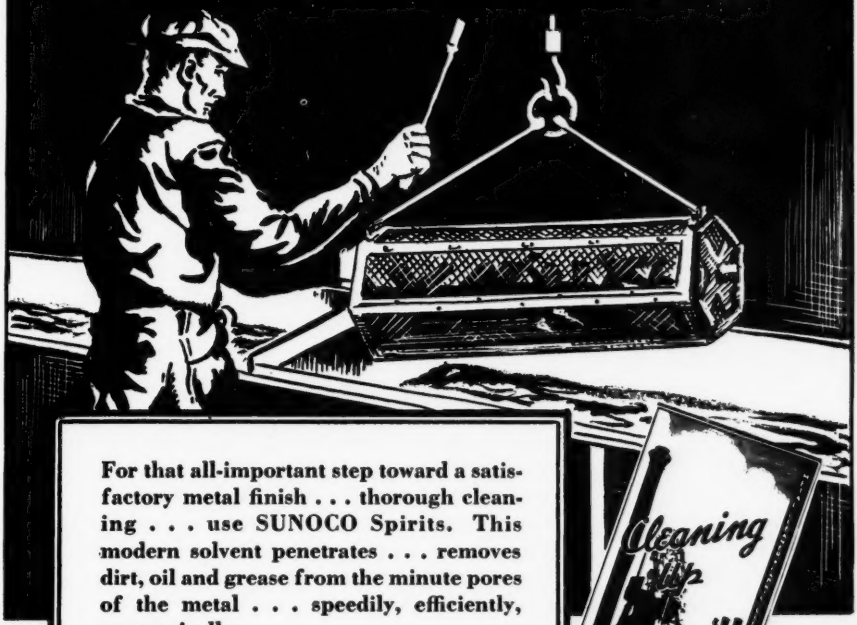

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high and narrow barrel, we would require one-tenth of one hundred gallons and likewise one-tenth of 32 ounces of soap or 3.2 ounces of soap to reduce ten gallons of water from 16 grain hard to zero hard or soft. This being true and easily demonstrable, **just what becomes of the recommendation to use two ounces of soap to each barrel load of work?** Surely it must be plain that the alkaline content of the soap being only two ounces in toto would be immediately consumed in an effort to soften the water, leaving the grease base which will immediately combine with the calcium and magnesium in the water to form sticky insoluble lime soap curds that will deposit on both the burnishing material and the parts to be burnished. Not only will the two ounces of soap be entirely inadequate for softening the water, but as soap is required for lubrication, there is no provision for this whatever. In such cases, it is not at all surprising that barrel finishing is condemned as not being suitable for a given work, when, as a matter of fact, it is neglect on the part of the operator to fully understand his conditions of operation, and failing in this the whole process is condemned.

More cases of unsatisfactory barrel finishing results can be traced to a lack of understanding of the importance of the water supply and the use of adequate quantities of soaps, or failure to reduce water to zero hard before the operation, than to any other cause. Surely, in the case of the water hardness of sixteen grains as noted, it is far easier and far less expensive to add sixteen ounces of trisodium phosphate to each one hundred gallons of water than to attempt to use thirty-two ounces of soap plus an additional thirty-two ounces in order to provide for both water softening and lubrication. It is not safe to assume that once you have determined the hardness of the water supply that you can regard the figure as being constant at that point year around, because the hardness of the water will vary from one part of the year to another. The hardness may check six in March, however, it can just as easily be sixteen in June. Surely, when everything necessary for determining water hardness can be assembled for a cost of less than $1.00, there is no excuse for any intelligent barrel operator to not know, from day to day, the exact water condition under which he is operating, and also the means of correcting the water from whatever hardness it may show at the time to zero hard or soft.

If it is important to give close study to water condition in plating, then surely it must be conceded that an equally close check must be held on water used in barrel finishing whether the barreling operation come before or after the plating operation. Soft water will reduce "w a t e r breaks" which are the result of incomplete emulsification of residual dirt or grease. Soft water will help to prevent the formation of insoluble lime soaps on the surfaces of the work which are caused by the chemical action of the calcium and magnesium on the fatty acids composing the base of the soap used. If the alkalie in the soap is used for reducing water hardness, inadequate amounts of soap can only tend to the formation of these insoluble lime soaps and in such cases clean or clear rinsing is all but impossible.

In a previous paper, we discussed the importance of the use of alkaline builders and wetting agents in soap solutions used in barrel finishing procedure, and we tried to stress, at that time, the importance of a study of the water supply and that every

Extreme Hiding Power

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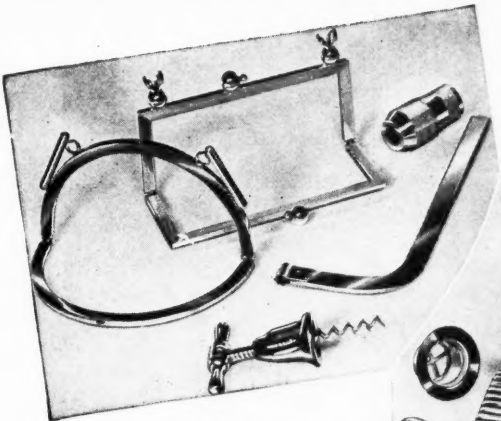
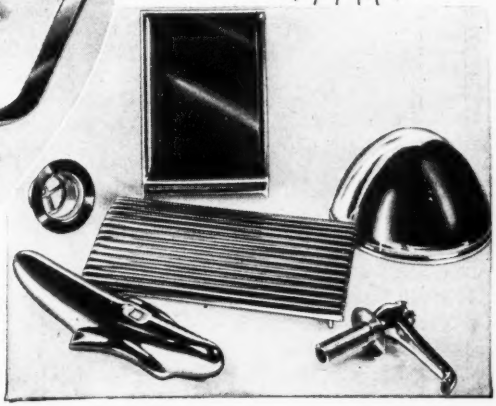
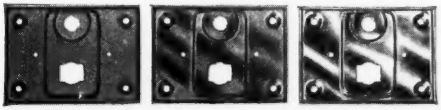


DIRECT ON STEEL (above)—No preplating of copper, polishing or buffing. These handbag frames were semi-fabricated after plating—entirely safe with Seymour Bright Nickel's superior ductility and adhesion.

SPECIFICATION JOBS (right)—Seymour Bright Nickel is ideal here; highly corrosion-resistant, readily controlled to any specified thickness.



THROWING POWER—Outstanding in Seymour Bright Nickel. See examples above.



BRIGHT DIP—1. Raw brass; 2. Bright Dip; 3. Seymour Bright Nickel. Striking example of hiding power without the usual build-up.

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SEYMOUR BRIGHT NICKEL

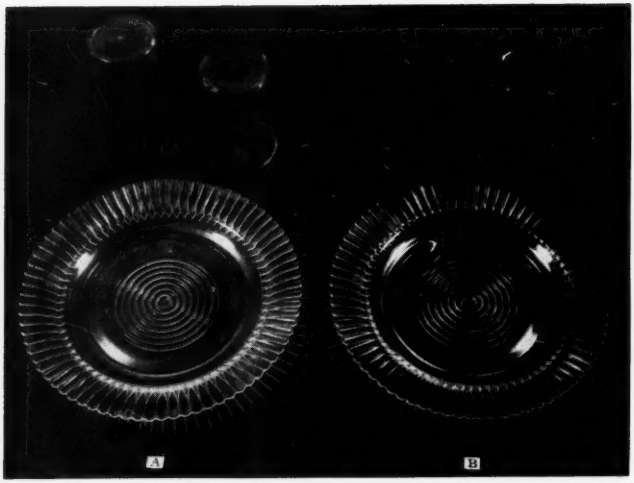
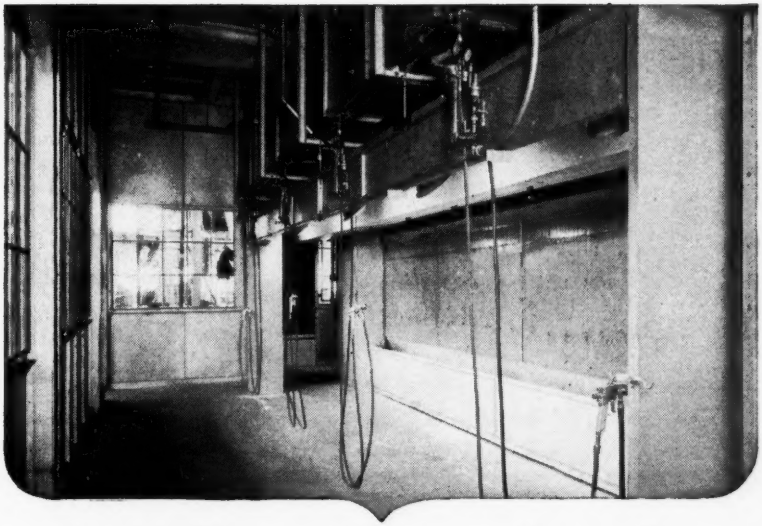


Fig. 3 — The glassware at the left in this illustration was washed and rinsed with ordinary soap. The glassware at the right was washed and rinsed with ordinary soap plus alkaline builders.

effort should be made to reduce otherwise hard water to zero hard or soft. Now alkaline builders may be of many different kinds. Some of them are applicable to barrel finishing and others are not, and our thought is that if we can make certain additions to the soaps ordinarily used, we may prevent the formation of the insoluble lime soaps and thus provide for cleaner work and clearer rinsing. A great many readers have asked us whether we could not illustrate in some way the importance of lime soaps and just how they manifest themselves in barrel finishing practice. We have a number of photographs showing the effect of these insoluble lime soaps, and first we illustrate Fig. 1. The glass discs shown on this plate represent laboratory glass dishes containing soaps. A and B are normal soaps such as are generally used in barrel finishing but unprotected against lime soap curd formation, and in these two illustrations the insoluble lime soap curds are plainly evident. C and D are the identical soap used in A and B, but to which we have added 14 per cent of tetra sodium pyrophosphate and 3 per cent Orvus W. A. as a wetting agent. It will be observed that in the discs C and D, the formation of the insoluble lime soap curds as shown in A and B are entirely absent. This is due to the fact that the addition agents have either prevented the formation of or else dispersed any indication of insoluble lime soap that may have tended to develop.

Fig. 2 shows an illustration of the same glass dishes used in Fig. 1. These same plates were carefully rinsed with both hot and cold water, and the discs A and B represent the same discs as A and B shown in Fig. 1, and where you will note the insoluble lime soap curds formed in the water on these plates in Fig. 1, you will notice the microscopic specks showing remainder of lime soaps that would not rinse away. C and D in Fig. 2 are the same discs as their equivalent letters in Fig. 1, but it will be noted that where the addition agents were added to the soap as shown in Fig. 1, the discs rinsed perfectly clear and clean on C and D in Fig. 2.

It would be very difficult to illustrate lime soap formations on flat



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pieces of metal unless highly magnified, and then the visibility would be much impaired, and for this reason we have elected to use glass. Your attention is now directed to the Fig. 3 accompanying this paper. This is of two identical sets of glassware, each consisting of a dish and two water glasses. The one marked A was washed in the same soap and water combination as shown in discs A and B in Fig. 1, and inspection of the illustration will reveal the formation of the film of insoluble lime soap over the entire surface, even though it was carefully rinsed in both hot and cold water.

The plate and two glasses marked B were washed in the soap solution as shown in C and D of Fig. 1, then rinsed in hot and cold water identically the same as the plate and glasses marked A, and it requires only a very casual examination to note the very marked difference between using a soap with the proper builders and an ordinary "out of the barrel" soap in either flake or powder form. Just as these results appear on glass, they will appear on the surfaces of metal products, but in the case of the latter, the difficulties are always multiplied because we have the element of porosity in metal surfaces that we do not have in glass surfaces. For that reason, the tendency of the insoluble lime soaps to lodge in pores on the surface of metal parts is very much greater than it would be on such a non-porous surface as would be presented by the glass articles used in the illustrations.

In connection with this discussion, it would, of course, be desirable to discuss also the various factors of Wetting, Absorption, Preferential Wetting, Emulsification, Deflocculation and Rinsing as they relate to addition alkalines and wetting agents, but allotted space does not permit. These factors will be covered in a following paper, but there is nothing in connection with the whole problem of adequate barrel finishing operations that is so much deserving of thought and attention than is the problem of a close study of the

Plastikon Rubber Putty is used to glaze the windows of the electrolytic tank house of the copper refinery of the Phelps Dodge Refining Corporation shown here.

(Photo Courtesy B. F. Goodrich Company)

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water supply and its relation to the results obtained from the barreling operation. Normally, we average about two hundred plant visits in a year and write close to two thousand letters on barrel finishing problems. It would be both interesting and instructive to the readers of this series if they could understand how many times the solution of barrel finishing problems hinges directly on the character of the water supply. It is most unusual to go into a plant and when asking the question "How many grains hard is your water supply?" to get the stereotyped answer "We don't know." If you are interested in obtaining the best results from your barreling operations **you should definitely know all about the water supply** and what is necessary to be done to correct it so that it functions best with the average burnishing soaps. Failing in that, the chances are that your results will never rise much above mere mediocrity.

"Pennsalt Concentrated Cleaners for Industry" is the title of an illustrated eight-page booklet on the application of alkaline cleaning to various types of industry which is now being published by the Pennsalt Cleaner Division of the Pennsylvania Salt Mfg. Co., Philadelphia, Pa. Short concise paragraphs with accompanying colored illustrations describe how alkaline cleaning can be successfully applied to the removal of dirt, oils, drawing compounds, paint, and so on, from metals prior to plating, enameling, painting, or bonderizing in soak, electrolytic, and power washer cleaning operations. Other points covered in the booklet include the cleaning of floors, walls, automobiles, and so on.

Copy free upon request.

The Finish on Your Product. The Ferro Enamel Corporation, 4150 E. 56th St., Cleveland, Ohio, is now issuing an attractive booklet entitled "The Finish on Your Product."

Some of the sub-headings of this interesting booklet are as follows: Choosing a finish; types of finishes; what is porcelain enamel?

A copy of this booklet will be sent free upon request.

Industrial Ovens Book. An attractively printed and bound, 24-page book has just been issued by The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati, Ohio, nationally known designers, fabricators, and installation contractors of sheet metal equipment. This book illustrates and describes a number of specially designed and engineered gas-fired and electric industrial ovens. It also contains important and valuable information for executives who are interested in faster and more economical drying, baking, and enameling operations.

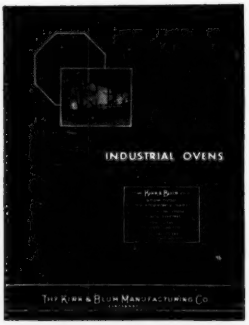

Illustration showing the Kirk & Blum Industrial Ovens Book.

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Review of Modern Finishing Methods. A comprehensive review of various methods of applying lacquers and enamels to metal products has just been published by Maas & Waldstein Company, 438 Riverside Ave., Newark, N. J. Copies of this review, which was presented by G. Klinkenstein, vice-president and technical director of Maas & Waldstein, before the recent annual convention of the American Electro-Platers' Society, are available on request.

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WETTING AGENT ACTION AND CONTROL

By Nathaniel Hall
Consulting Chemical Engineer

A WETTING agent is a substance which has the property of decreasing the attraction between molecules of a liquid in which it is dissolved. This attraction manifests itself at the surface of the solution where the surface molecules are drawn inward by the other molecules and the tendency to reduce the surface area to a minimum accounts for the spherical shape of a drop of water, the action of a blotter and the rise of water in a capillary tube.

When the surface of the liquid is in contact with air, the phenomenon is known as surface tension. Strictly speaking, surface tension of a liquid should be determined when in contact with the vapor but since the difference is only about ½ per cent, the same term is used for both conditions. When the surface of the liquid is in contact with another liquid, the phenomenon is called interfacial tension. It is the interfacial tension which the metal finisher works against in production, but it is the surface tension which he can more easily measure and therefore works with to control the quantity of wetting agent in his solutions.

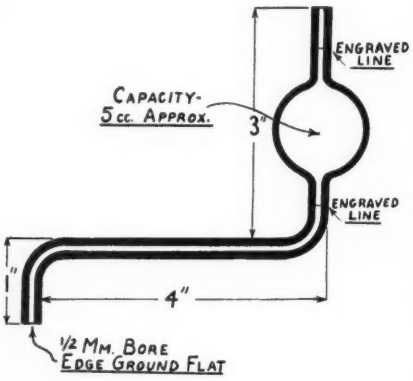
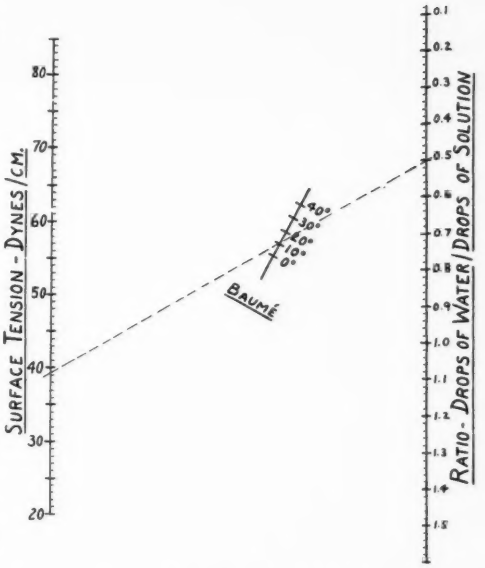


Fig. 1—Drawing of a stalagmometer

In alkaline cleaning solutions, the addition of wetting agents has been the practice for a long time, soap being the first to be used. Decreasing the attraction between the molecules of the solution results in better penetration of the cleaner between particles of dirt and grease and the metal being cleaned, lessening the bond between them for easier removal of the dirt and wetting the surface of the article.

In plating solutions, the same effect is present, and in addition, the force resisting the rising of the hydrogen bubbles at the cathode is decreased and hydrogen pitting is eliminated. This latter action is very easily noted in nickel plating baths. Plating with a new nickel solution, small bubbles form at the cathode and grow in size until the hydrostatic pressure of the solution on the bub-

Fig. 2—A nomograph which has been prepared to aid in determining the surface tension of a solution by means of a stalagmometer at 25 deg. C. (77 deg. F.)



ble is greater than the force holding it to the cathode surface, at which time the bubble detaches itself and rises to the surface. Many bubbles remain attached for a long time and since no deposit forms at that point a pit results. As soon as a wetting agent is added, the interfacial tension is decreased so that the bubbles rise almost as soon as they are formed and before they can increase in size. As a result, if a glassy battery jar is used in order to see the cathode reaction, the hydrogen gas may readily be seen leaving the cathode in the form of a fine mist instead of large bubbles.

In ball burnishing, the substitution of wetting agents for all or part of the usual soap additions is very advantageous, especially where hard water and low water temperatures are prevalent. Without proper precautions, such as the addition of water softening materials before adding soap to hard water, insoluble calcium and magnesium soaps of gummy consistency are formed. These coat the burnishing material shapes and make it impossible to get a good bright finish on the work. Since wetting agents, in general, are compatible with hard water, the danger from gum precipitation is obviated. In this connection, it should be remembered that the addition of soap to a burnishing barrel is not for the purpose of cleaning the work but for lubrication of the burnishing shapes as they do their work. The articles should be thoroughly cleaned before burnishing for good results. An excess of wetting agent is to be avoided, since the surface tension may be lowered sufficiently to remove the lubricating qualities of the solution, and as a result, the burnishing shapes instead of sliding over the work, gouge it and ruin the finish.

In the plating industry, the control of the wetting power has lagged far behind the application. It wasn't until wetting agents found employment in the plating solutions as smoothing and anti-pitting agents that the need for methods of control was felt. Since the surface tension is a measure of the wetting power, the determination of this quantity serves to establish the condition of the solution which by comparison with the optimum surface tension indicates the need for additions of wetting agent. As the effect on the surface tension is not the same for all wetting agents and for the various types

of solutions, the required additions must be determined for each individual case and the results recorded for future reference. In this manner a table is prepared showing, for instance, in the case of a nickel solution where the surface tension should be about 40 dynes per centimeter, how many ounces of wetting agent should be added to each 100 gallons if the surface tension as measured is 60 dynes. Testing after each small addition in order to learn when the correct value has been reached is thus avoided.

TABLE I

Temperature		Surface Tension
Deg. C.	Deg. F.	
5	41	74.9
10	50	74.2
15	59	73.5
20	68	72.8
25	77	72.0
30	86	71.2
35	95	70.4
40	104	69.6
45	113	68.8
50	122	67.9

Table giving the surface tension of water at various temperatures

There are three general methods for determining surface tension; the torsion balance, the drop weight, and the capillary rise methods. The torsion balance method, perfected by DuNouy determines the surface tension by measuring the force required to pull a small ring of platinum wire from the surface of the liquid. This force is measured by a special balance which is made for such measurements. The surface tension in dynes per centimeter is equal to the pull in grams required to break the ring away from the surface multiplied by the acceleration due to gravity which is 981 cm/sec./sec. and divided by twice the circumference of the ring (since there are two films pulling down-on the inside and on the outside of the ring). The ring is usually exactly 4 cm. in circumference so that the surface tension is equal to:

$$\frac{981 \times \text{weight}}{8} = 122.6 \times \text{weight}$$

The computations required are obviously at a minimum and the determination can be made very quickly. The chief disadvantages of this method are the difficulty of temperature control and the high cost of the apparatus.

The torsion balance is built on the same general principle as the magnegage developed by Brenner at the Bureau of Standards for testing the thickness of deposits by determining the force necessary to pull an Alnico magnet away from the surface being measured. Although the matter has not as yet been investigated, it would seem possible to convert the instrument at a small cost to an adaptation of the DuNouy instrument so that it could also be used for surface tension measurements. This adaptability would, to some extent, offset the cost factor.

The drop weight method is the one most familiar to the plater. The size of a drop of liquid falling from a fine orifice depends, among other things

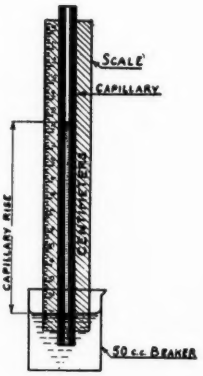


Fig. 3 — Drawing showing the capillary setup

on the surface tension. By counting the number of drops delivered by a capillary tube and comparing with a standard such as distilled water, alcohol or benzene, the surface tension may be determined. As an alternative, the weight of a given number of drops is compared with the same number of drops of water delivered under identical conditions and the surface tension is estimated from the ratio of the weights and the surface tension of the standard liquid. Since the latter requires a balance for weighing the drops, the former is generally employed in the shop. The device used is the well-known stalagmometer. For those who are unfamiliar with it a brief description would not be amiss.

A piece of glass capillary tubing about 0.5 mm. bore has a reservoir bulb blown about 1-2 inches from one end as shown in Fig. 1, with a capacity of approximately 4 or 5 cc. The exact volume is of no importance. Two lines are filed in the tube, one about ½ inch above the bulb and one the same distance below. The long end is bent as in the sketch and the delivery end is ground perfectly flat with sharp edges. This can be conveniently done by means of fine emery cloth. The stalagmometer is cleaned thoroughly and the filtered solution is drawn into the tube above the top line by attaching a rubber tube to the top. The number of drops are counted from the time the solution level is at the top line until it reaches the bottom line After rinsing well, distilled water at about the same temperature is run through and the drops counted. The surface tension of the solution is found by substituting in the following equation: Surface Tension of Solution = (Surface tension of water x No. drops

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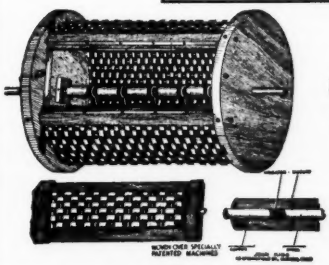

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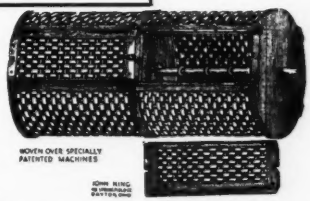

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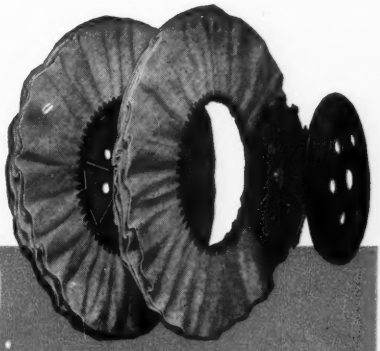

CORPORATION

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of water x specific gravity of the solution) divided by the No. drops of solution.

The surface tension of water at various temperatures is given in Table I. Since most platers use hydrometers which are graduated in degrees Baume rather than in metric units, Table II is included for convenience in converting from degrees Baume to specific gravity.

TABLE II

Deg. Be	Sp. Gr.	Deg. Be	Sp. Gr.	Deg. Be	Sp. Gr.
2.0	1.0140	16.0	1.1240	30.0	1.2609
4.0	1.0284	18.0	1.1417	32.0	1.2832
6.0	1.0432	20.0	1.1600	34.0	1.3063
8.0	1.0584	22.0	1.1789	36.0	1.3303
10.0	1.0741	24.0	1.1983	38.0	1.3551
12.0	1.0902	26.0	1.2185	40.0	1.3810
14.0	1.1069	28.0	1.2393		

Table for converting degrees Baume to specific gravity

This method is fairly simple and the apparatus is inexpensive. Since the results are determined by comparison with a liquid of known surface tension, it is necessary that both be at approximately the same temperature which is usually an inconvenience. The capillary should be vertical when delivering the drops and should not be shaken or exposed to excessive vibration when in use.

To avoid most of the calculations required in the above formula and thus simplify the use of the stalagmometer, a nomograph illustrated in Fig. 2 has been prepared according to the following formula:

$$\text{Surface Tension} = 72 \times \text{Sp. Gr.} \times \frac{\text{No. Drops of Water}}{\text{No. Drops of Solution}}$$

If Table I is examined it will be noted that a variation in temperature from a mean of 77 deg. F., at which the surface tension of water is 72.0 dynes, results in only a 2 per cent difference in the surface tension. The nomograph which is based on a temperature of 77 deg. F. will therefore offer sufficient accuracy between 60 deg. and 95 deg. F. for all practical purposes. The only calculation involved is the ratio of the number of drops of water to the number of drops of the solution. If a straight edge or ruler is placed at the number on the right hand line corresponding to the r a t i o and continued through the Baume reading of the solution, the straight edge will intersect the left hand line at the surface tension of the solution. For example, if a nickel solution shows a hydrometer reading of 10 deg. Be. and the number of drops delivered by a stalagmometer is 105 while the s a m e stalagmometer delivers 53 drops of distilled water, dividing 53 by 105 we get 0.505 as the ratio. Setting the rule at 0.505 on the right hand side of the nomograph and continuing through 10 deg. Be the result is read as 39.1 dynes, as shown by the broken line on the nomograph.

The stalagmometer test is the one commonly reported in the metal finishing literature and is usually rec-

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NORTON ABRASIVES

ommended for control purposes by distributors of wetting agents. It is surprising that the capillary rise method has not been suggested for surface tension measurements in view of its high degree of accuracy, extreme simplicity and independence of the temperature or any comparison with a standard once the bore has been determined. The only precaution required is the cleanliness of the bore. If the capillary tube is kept immersed in a large test tube filled with a cleaning mixture of concentrated sulfuric acid saturated with chromic acid when not in use, it will always be clean and accurate. The test is based on the tendency of a liquid to contract due to surface tension until a minimum surface is presented to the atmosphere. When a liquid wets a capillary tube it rises along the walls as a result of the surface tension until the force is balanced by the force of gravity tending to pull the column of liquid down, at which point the column or liquid remains stationary. The surface tension is represented by the following equation: Surface Tension = 245.3 x h x b x d

where: h = height of the column above the solution level in the beaker in centimeters

d = specific gravity of the liquid

b = bore of the capillary in centimeters

The only equipment required for the test is a 50 cc. beaker or other glass container at least 1¼ inches in diameter, a glass capillary tube between 0.2 and 0.5 mm. in diameter or bore and a centimeter scale as shown in Fig. 3. Naturally, the smaller bore will give a larger capillary rise with resultant increased accuracy. An excellent capillary can be made from an engraved scale glass thermometer with a range from —20 deg. C. to 120 deg. C. or above. A length of 10 to 12 inches is satisfactory. A file mark is made at the 10 deg. line so that a clean break can be made. The tube is also broken about 1 inch from the top. The result is a capillary tube with engraved graduations on which the height of the column can easily be measured in degrees when immersed in the solution to the 0 deg. line. The bore must be approximately circular in shape. The number of degrees can readily be converted to centimeters by laying the capillary tube on a centimeter scale after the rise has been noted.

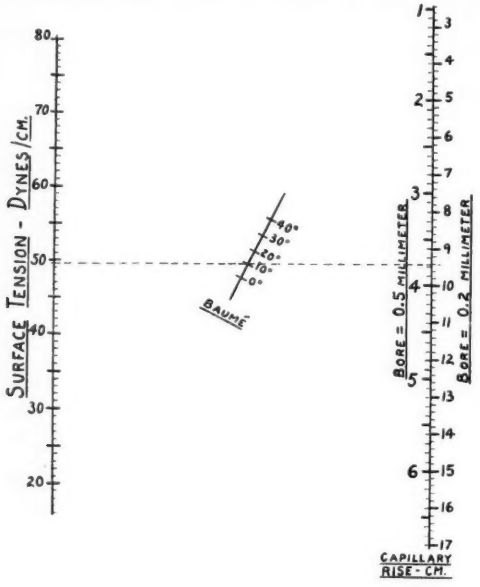
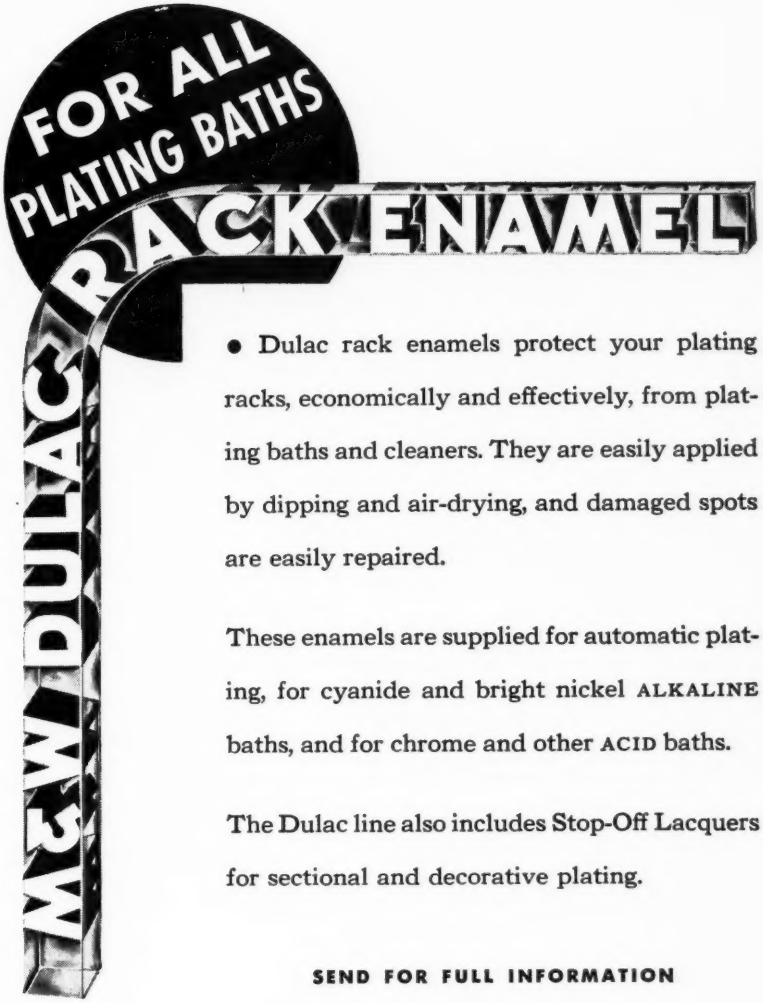


Fig. 4—A nomograph which has been prepared for checking the surface tension by capillary rise



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The bore is determined by measuring the capillary rise with distilled water in the cleaned capillary tube and substituting in the formula, the surface tension of the water at the temperature of the test being found in Table I. It is essential that the capillary be cleaned with cleaning mixture and rinsed thoroughly with distilled water between tests for satisfactory results. When cleaning a stalagmometer or capillary tube a rubber tube is connected to the end and the distilled water or cleaning mixture is drawn up from the beaker. The solution being tested must be filtered or allowed to settle in order to avoid clogging of the capillary with dirt.

If an analytical balance is available, the bore or diameter of the capillary tube may be rechecked by filling with mercury to a measured height and determining the weight of the mercury. From the weight of the mercury, which has a density of 13.6 gms./cubic centimeter, the bore may be determined from the formula:

$$\text{Bore} = 0.306 \sqrt{\frac{\text{Weight of Mercury (gms.)}}{\text{Height of column (cm.)}}}$$

The result should be fairly close to the figure determined from the surface tension of distilled water, an appreciable difference indicating a dirty capillary. The latter method is more accurate than the mercury method for standardization and its results are used for the bore.

As a practical example, a broken 250 deg. C. range thermometer was tested in the laboratory with the results shown in Table III.

It will be seen that the results from the mercury method are within less than 2¾ per cent of the capillary rise method of calibration, and if the average bore is taken as 0.0223 cm. the deviation is less than 1½ per cent which is more than satisfactory for plant requirements.

A nomograph has been prepared, as shown in Fig. 4, for solving the capillary rise equation with bores of 0.2 and 0.5 mm, which is used as explained previously for the stalagmometer, except that no calculation is necessary — the measured height and Baume being used directly. For example, if the capillary rise is 9.4 cm. in a capillary having a bore of 0.2 mm. and the hydrometer reading is 10 deg. Be, the result will be 49.5 dynes, as shown by the dotted line in the nomograph.

When the bore is not exactly 0.2

TABLE III

100 degrees on the thermometer scale = 11.5 cm., or 1 deg. = 0.115 cm.
Capillary rise — distilled water at 25 deg. C. = 116 deg. = 13.34 cm.

$$\text{Bore} = \frac{\text{(Surface Tension)}}{245.3 \times h \times d} = \frac{72}{245.3 \times 13.34 \times 1.00} = 0.0220 \text{ cm.}$$

Mercury Weight:	A.	B.
Height of Column	101 deg.	110½ deg.
Height of Column—cm.	11.61	12.71
Weight of Column—gms.	0.0633	0.0694
Bore from formula:		
$B = \sqrt{\text{Wt./Height}}$	0.0226 cm.	0.0226 cm.

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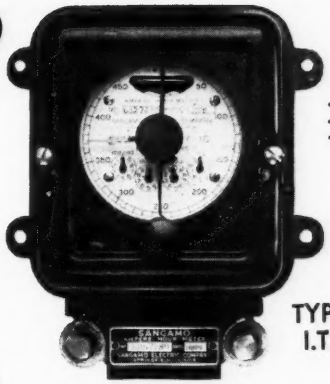

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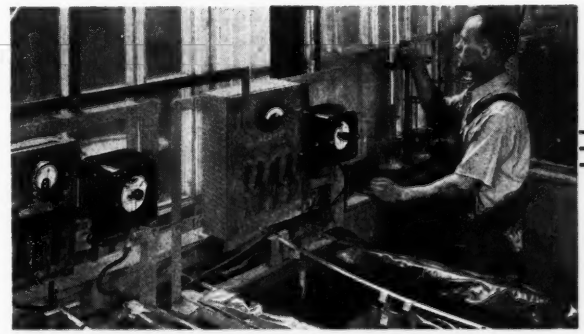

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or 0.5 mm., this nomograph may still be used by determining the surface tension with the 0.2 mm. scale on the extreme right of the nomograph and multiplying the result by five times the bore in millimeters. Thus, if the bore in the above example should be 0.3 mm., the surface tension as read with the 0.2 mm. scale would be 49.5 dynes. This surface tension is then multiplied by 5 times the bore, or $5 \times 0.3 = 1.5$ to give an actual surface tension of $49.5 \times 1.5 = 74.3$ dynes per centimeter.

The capillary rise method for surface tension testing gives the metal finisher a very simple analytical tool, one which is deserving of adoption because it requires only a few minutes, gives accurate results, can easily be made and replaced and does not require comparison with another liquid each time or at different temperatures. Even though the capillary must be carefully cleaned, it is usually more convenient to use than a stalagmometer. The employment of a nomograph to determine the surface tension from the test figures, instead of substituting in the formula and calculating with pencil and paper or a slide rule makes the determination less bothersome. The combination is an incentive for the plater to control his solutions analytically rather by rule of thumb methods, such as the observation of the amount of foaming, which are all too common.

Henderson Tumbling Barrels. A 16-page catalog featuring the Henderson line of tumbling barrels is now being issued by The Henderson Bros. Co., 131 Leonard St., Waterbury, Conn. The Henderson line includes two main types of barrels, namely, the tilting oblique and the horizontal type. Gear drives and built-in motors have provided advantages, and modern designing and better metals are enabling users to obtain the utmost in speedy tumbling from both floor styles and bench models.

The catalog includes specification tables and illustrations of the various sizes of barrels. A copy of this catalog will be sent free upon request.

Acme Automatic Polishing and Buffing Machines. The manner in which Acme automatic polishing and buffing machines cut unit cost on polishing and buffing jobs of every type is described in a four-page folder which is now being issued by the Acme Manufacturing Company, 1643 Howard St., Detroit, Mich. Acme installation includes machines for polishing and buffing grilles, body hardware, strip moulding, hub caps, wheel rings, and other parts of high production in the automobile industry.

A copy of this folder will be sent free upon request.

Drying Problems Made Easy With Radiant Energy Infra-Red Carbon Lamps. Information regarding infra-red ray radiant energy for drying, heating, baking, and dehydrating is contained in an eight-page catalog now being published by North American Electric Lamp Company, 1014 Tyler St., St. Louis, Mo. Infra-red ray radiant energy is concisely described. The manner in which the important factor of penetration is obtained is also included. The many applications for radiant infra-red ray drying and heating are profusely illustrated.

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"Notes on the Use of a Fast-Working Buffing Compound." This is the title of a four-page folder describing Learok, a clean, fast-working composition for the production of a high lustre or mirror finish on metal parts, which is now being issued by The Lea Mfg. Co., 14 Cherry Ave., Waterbury, Conn. The subject of the buffing composition is contained under heads such as the following: Why Learok Is Used; How Learok Is Used; Learok Methods; Learok for Plastics; Using Learok and Lea Compound on the Same Wheel; Grades and Uses of Learok.

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METAL COLORING THEORY AND PRACTICE—PART 6

By Joseph B. Kushner, Ch.E.
Electroplating Consultant

PURE iron, as far as the industrial world and the metal colorer are concerned, is a laboratory curiosity. The form in which it comes to the metal finisher is as steel, a grey white, tough and hard alloy of iron and carbon. Soft steel or wrought iron contains a few tenths of a per cent of carbon or less; ordinary steel contains about two per cent or less of carbon; brittle steel or cast iron contains about three per cent of carbon. Besides the essential alloying element carbon, small quantities of other metals such as nickel, chromium, molybdenum, tungsten, vanadium, silicon and manganese, are often alloyed with the iron. In the composition of the stainless or rustless steels much greater amounts of these alloying metals are found, a typical example being "18-8" stainless steel which contains 18 per cent chromium and 8 per cent silicon. As the percentages of the alloying metals go up, the more difficult it becomes to color iron.

Joseph B. Kushner

The position of iron in the electromotive series is rather high, which means that it combines quite readily with other elements. This is a boon to the metal colorer, since many of the compounds that it forms are beautifully colored. Unfortunately, however, a large number of these colored compounds are soluble, or are subject to decomposition, or else cannot be formed under conditions available to the metal colorer. Furthermore, the ease with which iron undergoes chemical change makes it particularly prone to its mortal enemy, rust, which is a form of ferric hydroxide. As a result, finishes for iron are chosen more for the protection they give rather than for esthic or decorative effect. Because of this, the number of finishes or colors that can be given directly to iron are rather limited, and to make matters worse, are of dark and somber hues, such as blacks, greys, dark blues and browns.

Coloring Methods

There are four greatly different ways or general methods for producing

colored finishes on steel (iron). (1) By heat treatment. (2) By chemical dips below the temperature of 212 deg. F. (3) By dipping in molten salts (this a combination of 1 and 2). (4) By electrochemical treatment such as electrodeposition or electro-oxidation.

Before some of these specific coloring methods are described, we wish to stress once more the need for good preparation prior to coloring. Correct cleaning of the iron or steel is very important. Scale must be completely removed, inasmuch as many of the finishing treatments do not effect it, and as a result, the complete job will present a mottled or blotched appearance.

Heat or Temper Colors

Probably the most interesting method for coloring iron is obtained by the direct application of heat in the presence of air or oxygen. Iron, when heated in air, rapidly forms superficial oxides. As the temperature or time of treatment is increased, the oxides increase in thickness, causing a continuous variation in the inteference colors (see Part I) produced. The cycle of colors runs something as shown below:

Pale yellow	220 deg. C.
Brownish yellow	255 deg. C.
Purple	277 deg. C.
Light blue	288 deg. C.
Dark blue	299 deg. C.
Grey black	316 deg. C.

The colors formed at the lower temperatures are rather unstable unless protected by lacquer or varnish inasmuch as the oxidation reaction continues, even at room temperatures, and tends toward the dark grey or black colors at the end of the series. The only really stable and protective colors formed are the blue and the black.

At this moment, it is interesting to diverge from the topic for a consideration of the mechanism of the formation of the oxide film, inasmuch as the basic principles involved hold true in general for almost all metal coloring reactions. As pointed out previously, coloring of metals is based on reactions that occur at the interface between the metal surface and the coloring compound. In the specific case of coloring iron by heat, we have an initial reaction between the iron atoms on the surface and the oxygen of the air surrounding it. This presumably is a second order reaction of the type $A + B = AB$ and its velocity is governed by the rate at which the iron and oxygen (A and B) are consumed. However, the moment the intitial surface film is formed, oxygen can no longer readily get at the iron below the oxide film. Now diffusion becomes the controlling factor. Oxygen must diffuse through the oxide film before any further reaction can take place. The velocity of the reaction is no longer governed by the true reaction velocity constant but by the rate of diffusion. Just how thick can the oxide film get after a given period of time and how long does it take to reach a given thickness at a given temperature?

A number of years ago, the great metallurgist, Tamman, made a research into this problem. Instead of working with iron and oxygen which require heat to react, he took an analogous case of silver and iodine vapor, the reaction of which takes place at room temperature. He passed a stream of air through an iodine solution then blew it at a silver plate. At given intervals of time, he measured the thickness of the silver iodide film and found from his computations a relationship of this type:

$Y = \sqrt{2pt}$; where Y is the film thickthickness, 2p a constant dependent on the rate of diffusion and t the time. He found that the film thickness varied with the square root of the time or, in other words, if the film of silver iodide was one unit thick after 1 second had elapsed it would be twice as thick after 4 seconds had elapsed. In general, relationships of this type hold for all metal coloring reactions whether in liquid or gaseous media and the rate of diffusion controls the thickness of color film produced.

To get back to the practical side of the paper, a logical method for producing temper colors is to immerse the objects to be colored in baths of molten material capable of maintaining a constant temperature. A number of alloys of lead and tin, and so on have been proposed for this purpose, but since the colors produced are rather fugitive, this particular method of coloring will not be discussed.

Temper Blue On Iron

Small objects can be blued by heating in a sand bath to about 650 deg. F. The sand should be kept on a hot plate or better yet in a slowly rotating drum or barrel, heated from underneath by several gas jets. After about 5 to 10 minutes of heating, a rich blue color will develop. If the temperature of 650 deg. F. is exceeded, the work will turn black. Of course, the work should be thoroughly cleaned first. A dip in muriatic acid or a slight flash of nickel accelerates the reaction in the sand bath.

The old Bowers-Barff Process of heat treatment coloring consisted of heating the objects to be colored to about 1,300-1,500 deg. F. in the presence of steam. A reaction takes place with the production of a fine black oxide finish. More modern methods for obtaining this finish make use of penetrating solutions and predips which act as accelerators for the reaction between the moisture and the iron.

Mottled Effects

Peculiar and gaudy colored mottled effects can sometimes be obtained by heating iron objects in a carburizing box containing, besides the carburizing compound, an additional 5 per cent potassium cyanide. The objects are heated until the colors appear, reds, yellows and blues, then are quickly quenched in oil. The colors obtained are not very lasting, however, because of the reasons mentioned before.

A good chemical **black dip** for iron consists of the following formula:

Selenious acid	.80 oz.
Copper sulphate	1.40 oz.
Nitric acid	.75 oz.
Water	1 gal.

The only drawback to the use of this solution is the fact that the selenious acid is rather expensive.

Another chemical method for **bluing or blackening** which also produces a number of other colors is the luster wash of the type described in a previous paper. A good formulation for use on iron is:

Sodium thiosulfate	1½ oz.
Lead acetate	1½ oz.
Water	1 gal.
Temperature	200 deg. F.

The colors that result from this process are interference colors formed by the passage of light through the extremely thin film of lead oxide that is formed on the iron.

A **gunmetal finish** can be produced by immersing iron objects in a bath containing the following:

Ferric chloride	32 oz.
Antimony trichloride	¾ oz.

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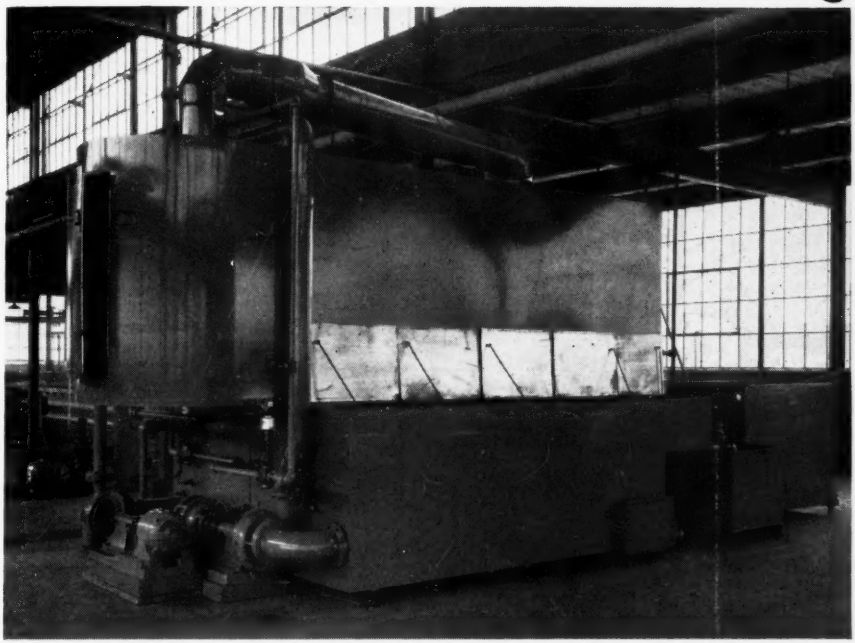

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Gallic acid .....¾ oz.
Water .....1 qt.
Temperature .....180 deg. F.

The colors produced by this bath run from pale blue to purple to dark grey.

A **grey finish** can be obtained on iron by immersing the work in a solution of:

Antimony trichloride ... 8 parts
Sulphuric acid ..... 2 parts
Acetic acid .....½ fl. oz.

Rinse well and brush with a steel wire brush. If the color is not uniform, repeat operations.

There are a number of methods for **browning and blackening** steel based on the production of artificial rust by means of corroding agents and heat treatments at lower temperatures. The average process can be operated as follows:

1. Clean work in a hot caustic cleaner.
2. Rinse and dip into the corroding solution.
3. Permit the solution to dry on work and repeat once more.
4. Place in an oven heated to about 145 deg. F. for 30 min.
5. Transfer to an oven with high humidity atmosphere and heat at 145 deg. F. for about 2 hours.
6. Remove articles and rinse in boiling water.
7. Scratch brush and repeat operations again if necessary.

Two good solutions for effecting the corrosion are the ones given here:

1. Ferric chloride .....4 oz.
   Mercuric chloride .....1.2 oz.
   Copper sulphate ..... .6 oz.
   Nitric acid .....1.8 oz.
   Potassium nitrate .....6.2 oz.
   Grain alcohol .....4 oz.
   Water.....To make 1 gal.

2. Ferric chloride .....2.8 oz.
   Ferrous sulphate .....1.5 oz.
   Nitric acid .....8.5 oz.
   Grain alcohol .....3.2 oz.
   Water.....To make 1 gal.

The browns produced are rather unstable and must be protected from further oxidation by treatment with acid-free oils or waxes. The brown colors are transformed to black if on completion of the process the work is heated in boiling water or live steam which reduces the reddish oxides to the lower oxides, which are black.

A dip bath for **blackening steel** which the author has not tried is the following formulation:

Sodium hydroxide .....200 oz.
Sodium nitrate ..... 5 oz.
Sodium nitrite .....80 oz.
Litharge ..... 4 oz.
Urea ..... 3 oz.
Temperature.....150-160 deg. F.

Probably one of the best methods for obtaining a gun metal blue is by the use of molten nitrates. A mixture of

Potassium nitrate .....1 part
Sodium nitrate .....1 part

is melted in a cast iron or steel pot. It is very important that the pot be absolutely free from rust or dirt, due to the fact that these have a deleterious effect on the quality of the work turned out. The melted mix should now be superheated to about 900 deg. F. and very slowly add in about 2 per cent by weight of black manganese dioxide. The addition of manganese dioxide causes the molten mass to assume a greenish hue and also causes any impurities present to slowly settle to the bottom of the pot. In order to keep the pot in proper operating condition, the manganese dioxide must be replenished

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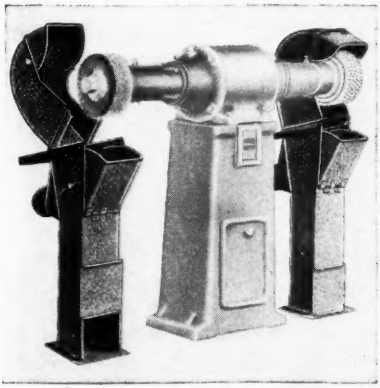

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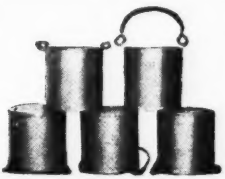

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from time to time. About ½ lb. of manganese dioxide to a 150-lb. mix, added every three hours or so, is a sufficient replenishing amount. The exact function of the manganese dioxide is not known, but it is known that it performs the important task of precipitating any iron oxide present in the molten mix after work has been treated, thus readying it for the next batch.

An excellent peacock or temper blue can be consistently obtained by the following procedure:

1. Clean work thoroughly.
2. Coat thinly with clear oil.
3. Immerse in the nitrate pot at 600-650 deg. F. The work can be suspended in baskets of wire or directly on wires.
4. Hold the work in the molten niter until the desired color is achieved.

Do not exceed an immersion time of 4 to 5 minutes, as work held beyond this time will turn black or grey. If the cleaning has been poor, a mottled surface effect will be seen at once. It is very important to remember that no moisture must be present on the work before immersion because moisture may cause considerable spattering of the nitrates. In the particular case of small steel parts, a final coating of hot oil over the work will prevent the formation of red rust spots. The color of the blue produced varies from light to dark as the temperature of the mix increases from 600 deg. to 1,000 deg. F. It will also be found that cast iron requires higher temperatures and longer treatments for the formation of the blue color.

There are a number of patented protective finishes for iron and steel that go under various trade names such as Parkerizing, Bonderizing, and so on. Basically, they are alike to a large extent inasmuch as they protect the iron by the formation of a complex phosphate on the surface. The color of these finishes is generally grey or black.

Iron can also be colored by depositing copper on it and coloring the copper according to formulas described in Part IV. Black nickel deposits may be also used to color iron black. There are also a number of patented electrochemical treatments involving oxidation.

The stainless or rustless steels are particularly difficult to color. They contain high percentages of chromium and other metals and do not readily react with chemical reagents because of their extreme assivity. There are, however, several patented processes which claim to be able to produce colors on stainless steel. The writer has not had much experience with these. One of the latest patented methods is one for coloring stainless steel black. The patent is controlled by the Alleghany Ludlum Steel Corp.

Oxidizing agent such as
Ammonium vanadate, 10-14 parts
Sulphuric acid .....36-50 parts
Water .....40-50 parts

The sulphuric acid by itself must be strong enough to dissolve and attack the stainless steel. The recommended temperature is about 185-200 deg. F.

Permacel Masking Tape. Paper masking tape, to be known as "Permacel," is now being marketed by Industrial Tape Corporation, New Brunswick, N. J. According to the manufacturer, it is possible to obtain instant adhesion with Permacel masking tape. This tape is highly resistant to lacquers, paints and solvents.

Permacel masking tape is said to provide the means for obtaining clean, sharp edges.

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At 4 P.M. on February 13th we gave your Mr. Law an order for one sample endless belt asking him to rush all possible and to our great surprise and pleasure, same arrived the following morning, today, at 9:30 A. M.

MAYBE it will "surprise and please" you, too, to discover that there is *one* coated abrasive manufacturer set up to give you 24-hour action on orders — 48-hour action on "specials" — a manufacturer who will break his production schedule so you won't have to break yours!

We know that our experience and high manufacturing standards will produce better coated abrasives, and we're willing to prove it the best way we know* . . . but we also know that many's the time an abrasive user is more interested in fast service than anything else. So, if even a Free Offer won't tempt you, keep AP in mind for the next time you need abrasives — quick. Then climb aboard the AP Express and learn the meaning of Service! Abrasive Products, Inc., 509 Pearl St., So. Braintree, Mass.

*** CUT YOUR FINISHING COSTS! WE TAKE ALL THE RISKS . . .**

Order a ream or 50-yard roll of the coated abrasive that meets your needs. Use up to half. If it hasn't reduced your finishing costs, return the unused half to AP and *no bill* will be sent. Reach for this saving now!

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News OF THE INDUSTRY

New Developments in Wrinkle Finishes Revealed at Technical Production Conference

ATTENDING the Technical Production Conference held by New Wrinkle, Inc., in Dayton, Ohio, May 17th and 18th in the interest of its manufacturing licensees were more than 100 engineers and chemists. One or more representatives from the following firms attended the conference: Advance Paint Company, Allied Finishing Specialties, Arco Company, Atlas Powder Company (Zapon Div.), Ault & Wiborg Corporation, Barrett Varnish Co., R. A. Becker Varnish Company, Berry Brothers, Inc., Buckeye Paint & Varnish Company, A. Burdsal Company, Chicago Bronze & Color Works, Cincinnati Varnish Company, Clinton Company, Cook Paint & Varnish Company, DeSoto Paint & Varnish Company, F. J. Donahue Varnish Company, Columbus Var-

Conference sessions were held in the new laboratory building of New Wrinkle, Inc. Mr. William A. Waldie, technical director, is shown addressing the first meeting on the subject of basis formulation used in wrinkle finishes.

nish Company, Egyptian Lacquer Mfg. Co., Felton-Sibley Co., Inc., Ferbert-Schorndorfer Co., Flood & Conklin Co., Forbes Varnish Co., The Glidden Company, J. E. Harris Company, Illinois Paint Works, Impervious Varnish Company, Indianapolis Paint & Color Co., Jones Dabney Company, Kay & Ess Company, Lilly Varnish Company, Chas. R. Long, Jr. Company, Lowe Bros. Company, Marietta Paint & Color Co., Maas & Waldstein Co., Patterson Sargent Company, Pittsburgh Plate Glass Co., Rinshed-Mason Company, Rockford Varnish Company, Roxalin Flexible Lacquer Company, Schaefer Varnish Company, Sherwin-Williams, Speed-O-Laq Products Company, Standard Varnish Works, Stanley Chemical Company, Sullivan Varnish Co., Thresher Varnish Company, Tousey Varnish Company, Universal Paint & Varnish Co., Varnish Products Company.

The Technical Production Conference was held to acquaint Wrinkle paint manufacturers with the problems arising from the increasing demand for Wrinkle Finishes. Brought to the attention of its licensees were all new developments, particularly the formulation of both varnish and alkyd types of Wrinkles on which New Wrinkle chemists have been working for the past year. These new formulations were shown and demonstrated in the laboratory in the presence of every one.

In addition to New Wrinkle's latest disclosures on matters of manufacturing and formulation, considerable attention was given to infra-red ray drying. After an early registration Friday morning, May 17th, the conference settled down to a discussion of basic materials and methods of manufacture which was led by Mr. William A. Waldie, Technical Director of New Wrinkle.

Following the noon adjournment, the meeting was resumed and was devoted to proper application and the correct technique used in spraying Wrinkle finishes. Several of the latest developments in spray equipment were shown and their outstanding features explained and demonstrated. The subject of finishing room control as applied to Wrinkle materials and spray equipment was discussed. Mr. L. W. Lammiman of the De Vilbiss Company, placed considerable stress on the necessity of proper regulation of both atomizing air and fluid pressures to assist in controlling the texture of the finish desired.

"AHCO" GRINDING COMPOUND

Saves up to 50% of the time required for barrel grinding of small parts, producing a better surface for subsequent burnishing than can be obtained from the usual methods of wet grinding.

Ahco Burnishing Compounds produce a high lustre in a minimum of time.

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WATERBURY CONN.

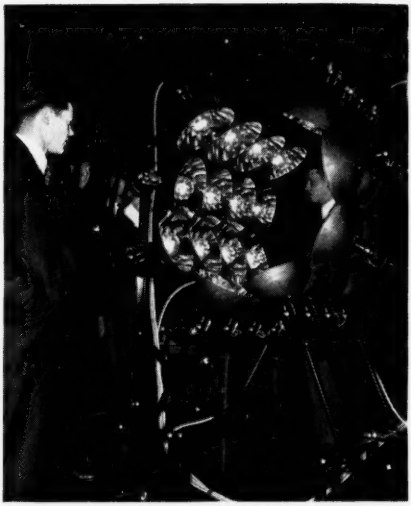
The evening session opened with a dinner at the Engineers Club and was followed by further discussions and demonstration in the auditorium. The advantages and applicability of Wrinkle paint baking with near infra-red was presented to the meeting by Mr. Howard Haynes, Nela Park Engineering Department, General Electric Company, Cleveland, Ohio.

At this point Mr. L. W. Lammiman again addressed the conference with a short talk regarding proper spray gun air cap and fluid nozzle combinations required to handle various types of Wrinkle materials.

Next on the program was Mr. Hendricks of the Dayton Manufacturing Company, who told the group that for the last two years his company has applied their experience in specialized lighting toward developing reflecting equipment for directing infra-red energy for baking Wrinkle and other painted surfaces.

Mr. Hendricks closed by extending the uses of their laboratory to paint manufacturers for development work and to industrials interested in an infra-red installation.

Next on the evening's program at the Dayton Engineers Club were representatives of the Fostoria Pressed Steel Corporation, manufacturers of "Para-Sphere" reflector equipment for the infra-red process, who presented one of their standard flexible tunnel sections for inspection by the conferees.



Members of the Technical Production Conference displayed unusual interest in the relationship of infra-red drying equipment to wrinkle finishes. The flexible tunnel section shown in this illustration is of special design.

Opening the Saturday morning session, Mr. C. W. Blacketer, Diamond Alkali Company, discussed "Multifex," a new form of calcium carbonate, so fine in particle size that it may be dispersed to a colloid, and the desirable effects that are produced when well dispersed "Multifex" is used in Wrinkle enamels. Though "Multifex" is a dry powder which is to be handled in the paint industry by methods and equipment customarily used for pigment incorporation, it was emphasized that "Multifex" is not a pigment. It is not used because of color, for opacity or as a filler, the usual functions of pigments. Its value is based on its ability to induce behavior in wet paints and conditions in dry films not related to color, opacity of "fill."

Interest was further stimulated by the announcement of "Wrintex," a new resin.

TO MAKE PAINT STICK

DEOXIDINE prepares metal surfaces perfectly for painting. Removes oil, rust, and rust stimulators. **GRANODINE** phosphate coats ferrous metals; bonds paint, and increases its life and protective effect. **LITHOFORM** phosphate coats zinc and cadmium and makes paint stick to the metal.

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Only PENTRATE (PATENTED) does all 4

Labratory Tests show 30% to 80% friction reduction on PENTRATED Parts. PENTRATE is a positive aid to Lubrication

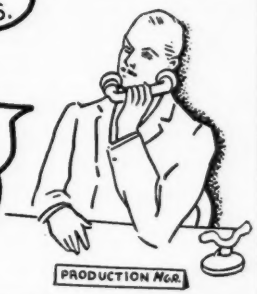
PAINT DEPT.

PENTRATE is an excellent bonding agent for Paints and Laquers on steel. We use only one coat now.

The sleek satin Black appearance and rust resistance of PENTRATED parts and Tools are great sales helps.

SALES MGR.

We are delighted with the simple, controlled operation and amazing Low cost of PENTRATE



PRODUCTION MGR.

HEATBATH CORPORATION

SPRINGFIELD - - - - - - - - MASSACHUSETTS

C. M. Knights Appointed Manager of H-VW-M Detroit Office

According to a recent announcement, Cecil M. Knights has been appointed manager of the Detroit office of the Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturer of electroplating equipment and supplied.

Mr. Knights is truly a specialist in the electroplating industry. A graduate of the Public High School of Chicago, he spent four years as an apprentice at the National Plating Company in Chicago working in every department, thereby gaining a thorough knowledge of polishing and plating, after which he became the owner of the Central Plating Company of Chicago, a job and contract shop. Mr. Knights continued in that capacity for ten years. He then accepted an offer to take charge of the polishing and plating department of the Chicago Flexible Shaft Company where he remained for three years. In 1929, he joined the Hanson-Van Winkle-Munning Company as a salesman with headquarters in the Chicago office. Mr. Knights remained at this post for eleven years. He was transferred to the Detroit office on October 1, 1939, and on January 1, became manager of that office.

Having spent practically all of his working life in the electroplating field,

C. M. Knights

Mr. Knights is known throughout the industry, especially in the West. He takes his new post with the good wishes of all of his associates and many friends throughout the industry which he has so long served.

Unmatched Speed
New Features
Lower Prices

New opportunities for shortcuts and savings in finishing operations are yours with one of the new AIRFLOS. Write today for illustrated catalog.
CROWN SPRAY GUN MFG. CO.
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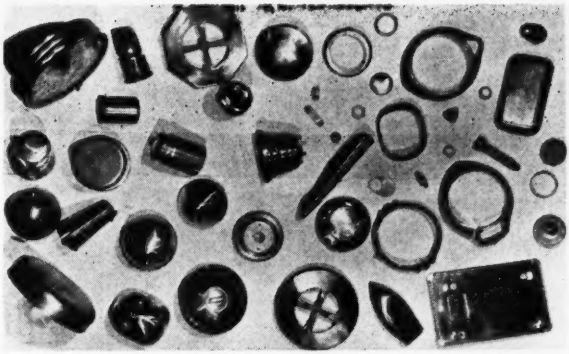
TEN NEW Airflo PORTABLE PAINTING OUTFITS
Warehouses in Principal Cities

Polishing and Buffing Test Laboratory Inaugurated by Continental Roll & Steel Foundry Company

The Industrial Equipment Division of the Continental Roll & Steel Foundry Company, 144th and Railroad Ave., East Chicago, Ind., has established a testing laboratory to make polishing and buffing time and method studies.

Primarily designed to determine what pieces submitted to the laboratory can be effectively handled on a Continental Semi-Automatic Polishing and Buffing Machine and to determine what savings can be effected over other methods, the laboratory even in its short existence, has made a number of worthwhile finds for manufacturers and metal plating firms.

The recommendations issuing from the laboratory have resulted in savings in work chucking costs, more effective use of abrasive resulting in savings, and recommendations concerning redesigning to produce contours that polish



A representative group of parts which have been submitted to the Continental Roll & Steel Foundry Company laboratory for polishing and buffing time and method studies.

•

more readily. Findings have been submitted to users of Continental Polishing and Buffing Equipment, prospective users and others.

There is no obligation on the part of manufacturers who wish to submit pieces or parts to the Continental Laboratory to determine if they will lend themselves to semi-atuomatic polishing and buffing. All of the facts that evolve in the course of the test are recorded and data furnished the manufacturer. This shows whether it can or cannot be done, what the saving will be, what abrasives and buffing compounds proved most suitable, and so on.

A representative group of parts which have been submitted are shown in the accompanying illustration. All were polished and buffed semi-automatically with varying savings depending upon the finish required, the contemplated quantity of pieces to be handled, base metal, condition of surface, chucking time and other factors.

Mention PRODUCTS FINISHING when writing to advertisers.

A NEW NICKEL STRIPPING PROCESS USING

STRIPODE

(Patent applied for)

An inhibiting agent for Sulphuric Acid strip baths that—

PREVENTS PITTING AND ROUGHENING OF THE BASE METAL

(Steel, brass, zinc die castings, heavy zinc and lead bearing alloys)

STRIPODE

Reduces Finishing Costs to a Minimum
Reduces Stripping Time by 50% or More in Many Cases
Reduces Your Scrap Loss
Strips Plating Racks
Saves Acid

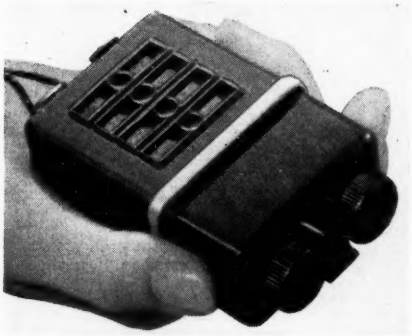
Write for information and literature.

CHEMICAL CORPORATION **93 Broad Street**

SPRINGFIELD, MASSACHUSETTS

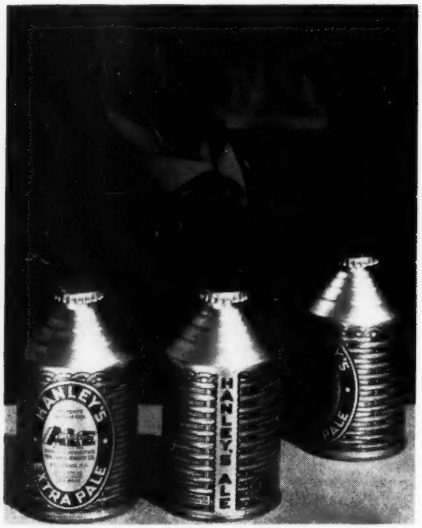
Finishes THAT AID IN APPEARANCE AND UTILITY

(Right)—The case enclosing this modernly styled hearing aid is made of a zinc die casting. The metal band surrounding the unit is polished aluminum. The case and knobs are finished in opalescent gray brown enamel.



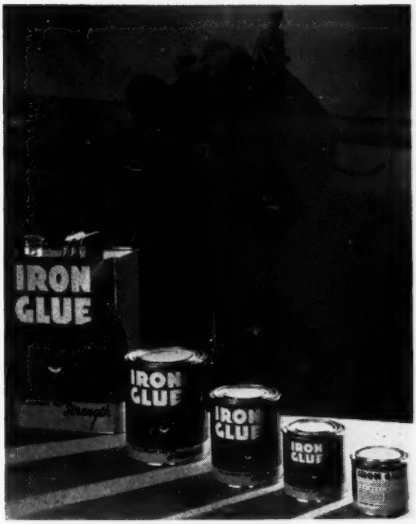
(Photo Courtesy Designers for Industry, Inc.)

(Photo Courtesy Modern Packaging Magazine)



(Left)—This "Silver Jug" is a metal bottle constructed without side seams, and lined inside and out with aluminum for maximum quality, appearance and flavor protection.

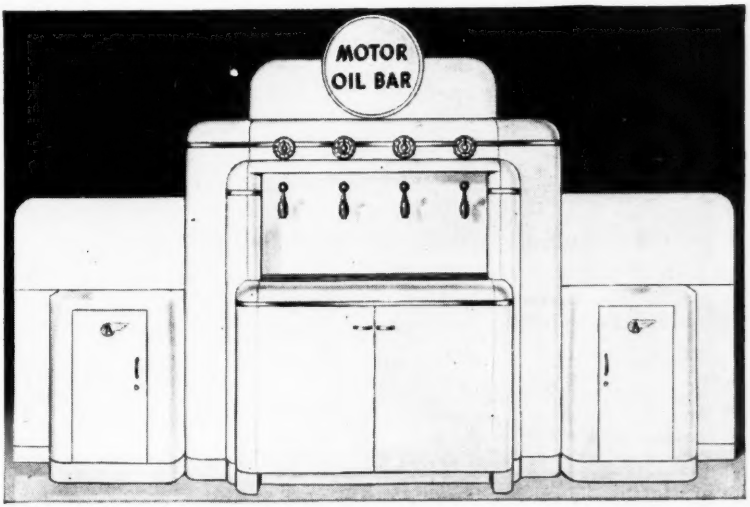
(Right)—An elephant, lithographed in black upon a red background, is straining to pull his trunk from a pool of glue, which is represented by a band of yellow running around the base of the cans. The product name stands out boldly in heavy white letters. Black lettering on a white panel gives instructions for using the glue.

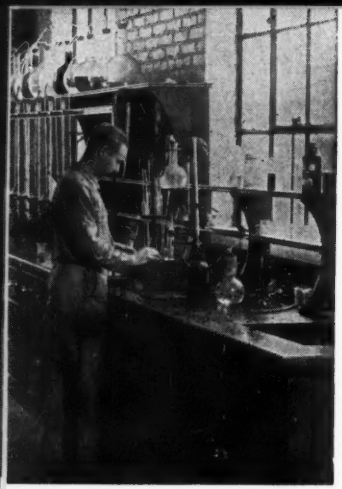


(Photo Courtesy Modern Packaging Magazine)

(Below)—The "Motor Oil Bar" shown here is finished in white baked enamel, with stainless steel trim, and the bottom strip in Alemite maroon.

(Photo Courtesy Alemite Div. Stewart-Warner Corp.)





THE Finishing FORUM

Working Conditions Improved by Synchronizing Operation of Spray Booth Exhaust Fan and Unit Heater

By Francis A. Westbrook

THE Allen Electric & Equipment Company, Kalamazoo, Mich., has recently installed a new spray booth ventilating system which is a great improvement on their old system. This has been accomplished by synchronizing the operation of the exhaust fan with a unit heater having automatically controlled outside air connections. The installation was made in connection with an addition to the existing building although the new booth has only been changed from one location to another in the old building to improve the layout.

Difficulties had been experienced in the operation of the spray booth exhaust due to the fact that there was no air supply to the building at all. The exhaust fan for ventilating the booth is of the propeller type which does not operate very satisfactorily against resistance. With the building closed up in the winter, the only air which could enter to make up for that exhausted from the booth was that which could leak in around the windows and doors. As the building is comparatively new, the air leakage at these points was not sufficient

Do you have a metal finishing problem?

Through the cooperation of outstanding authorities in the fields of metal cleaning, plating, burnishing, lacquering, and so on, PRODUCTS FINISHING is prepared to aid you in the solution of your finishing problem. There is no charge for this service.

Also . . .

If there is a "kink" or short cut in use in your shop, send in a description of it. Each one published will be paid for.

to prevent the fan from building up a vacuum. This naturally imposed a resistance on the fan and due to the fact that it is of the propeller type it lost capacity very rapidly.

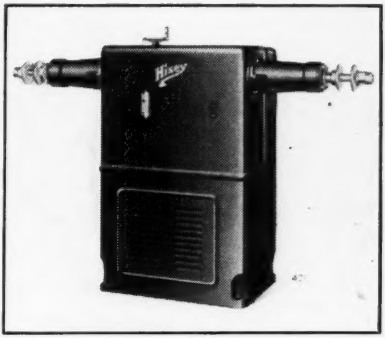
By installing a unit heater with outside fresh air connections, and operating it when the exhaust fan in the booth is running, the difficulty was overcome, because it supplied the necessary make-up air to compensate for that removed. When the exhaust fan is shut down, the damper motor shifts the outside air connection so that the unit re-circulates the air. This has provided better ventilation for the booth and has improved working conditions.

Leaks of cold air around windows and doors due to the action of the exhaust have been done away with, and the automatic shifting, or closing, of the fresh air damper for heater intake when the exhaust is shut down reduces loss of heat to a minimum.

The unit heater installed is of the horizontal suspended type. The unit itself is located under a section of the building having a saw tooth roof, and adjacent to a section having a flat roof, the fresh air connection is brought up from the unit and run into the side of the vertical portion of a saw tooth constructed unit.

Setting of the dampers is accomplished by means of a two-position damper motor. This is inter-connected with the exhaust fan motor through a relay. Thus when the exhaust fan is started the relay is actuated and causes the damper motor to close the re-circulating damper and open the fresh air damper. When the exhaust fan is stopped, the position of the dampers is reversed and air is re-circulated through the unit heater. Of course, the size of the unit heater is such that it handles

"Hisey"
I. V. S.
BUFFER



INFINITELY VARIABLE SPEED!!!

The Hisey I. V. S. Buffer affords the most efficient speed for cutting, buffing or coloring for any practical size wheel. Worn wheels can now be used up efficiently until only a small stub is left. Any and all speeds from 1000 to 3500 R.P.M. are instantly available.

1000 TO 3500 R.P.M.

by merely turning the hand wheel. The Allis-Chalmers "Vari-Pitch Speed Changer" takes care of all the rest. Spindle Speed is constantly indicated, reading directly in R.P.M. on dial.

The speed changing device is exceedingly simple. There are absolutely no gears, frictions, chains, rheostats or change pulleys. The entire drive is through the popular multiple "V" belts.
Hisey I. V. S. Buffing and Polishing machines are made in 3, 5, and 7½ H.P. capacities and can be furnished with or without motors. Any standard motor can be used.

Write for Catalog 50P

THE HISEY-WOLF MACHINE CO.

"It's High Grade If Hisey Made" — Hisey — Established 1896 CINCINNATI, OHIO, U.S.A.

Electric Tools . . . Grinders . . . Buffers

just about the same volume of air as the exhaust.

Room temperature is controlled by by-pass dampers built in the unit heater which are operated by a modulating damper motor. The latter is positioned by the room thermostat. The heater is also equipped with adjustable vanes, making it possible to direct the flow of air to suit conditions.

The Facts on Polymerin. A new handbook entitled "The Facts on Polymerin" is now being distributed by Ault & Wiborg Corporation, 75 Varick St., New York, N. Y., as a manual of information on speed finishing applications and methods.

The book describes how Polymerin industrial finishes are being used in various industries. Photographs show some of the products (such as washing machines, refrigerators, bicycles, Venetian blinds, stoves, and lamps) that have proved to be well suited to this type of speed-finishing operation.

Why Polymerin is different from conventional finishes, and how it depends on the intricate chemical action of polymerization for its rapid curing characteristics are also outlined in the book. There are certain variations of the original high-bake Polymerin formula which make it possible to adapt the Polymerin-type finishes to meet the specific requirements of individual jobs. The book tells how Polymerin-100 is being used where low temperature baking is desirable. Polymeroid, a hammered-effect Polymerin-base material, is designed for rough and porous metal surfaces.

Included in "The Facts on Polymerin" are pictures of finishing and baking operations. One photograph shows an infra-red baking set-up, where the Polymerin baking schedule is under five minutes. There is a drawing of strip steel coating equipment, which bakes out Polymerin in 60 seconds.

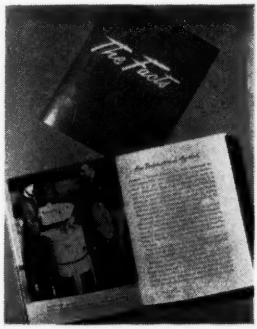
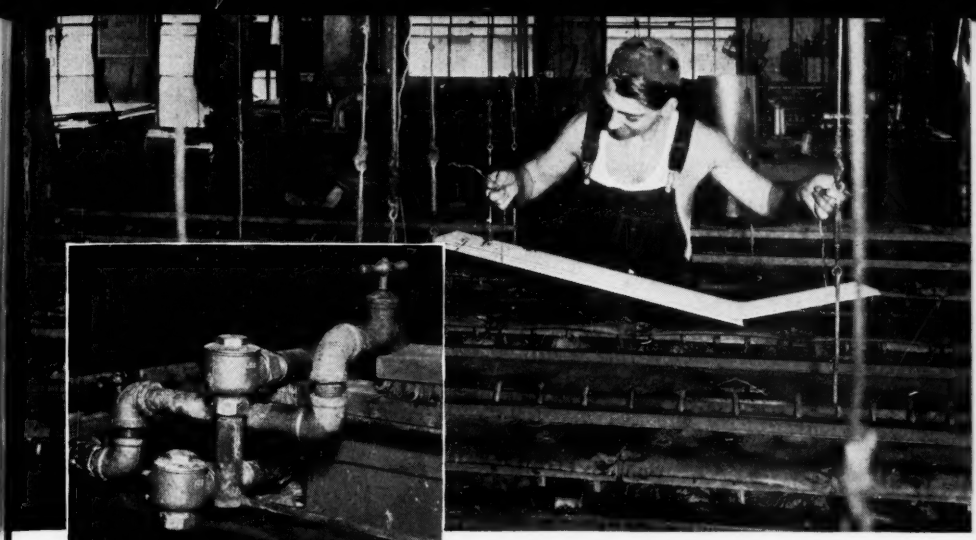


Illustration showing "The Facts on Polymerin."

This handbook is available to finishers who write to Ault & Wiborg Corporation, 75 Varick St., New York, N. Y.

The New Wrinkle Laboratory shown here will be open for inspection to the visitors of the American Electroplaters' Society Convention during the week June 10th to 14th.



General view in plant of Philip Sievering, Inc., New York City. At left, a close-up of Webster Process Steam Traps in use.

TANKS AND OVENS HEATED WITH 25 P. C. LESS STEAM

Philip Sievering, Inc., electro-platers and polishers, reduced steam consumption approximately 25 per cent by equipping their heating ovens, plating tanks and drying ovens with Webster Process Steam Traps.

In the Sievering plant, Webster Traps help the high pressure equipment to develop maximum output by insuring prompt and continuous discharge of air and water of condensation.

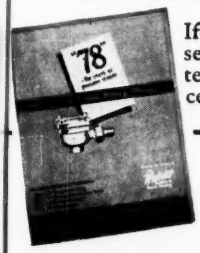
In discussing the application of Webster Traps to the electro-plating and polishing equipment, Philip Sievering says:

"In May, 1938, we made a trial installation of a Webster Trap on one of our heating ovens. Having been favorably impressed with the results, we decided to install Webster Traps on all of our plating tanks and drying ovens which are heated by steam. The results so far have more than borne out our earlier impressions.

"While it is hard to check the exact savings in dollars and cents, we estimate that it amounts to approximately 25 per cent.

"In addition," Mr. Sievering says, "we have eliminated the fuss and bother of turning on, shutting off and regulating the exhaust valves."

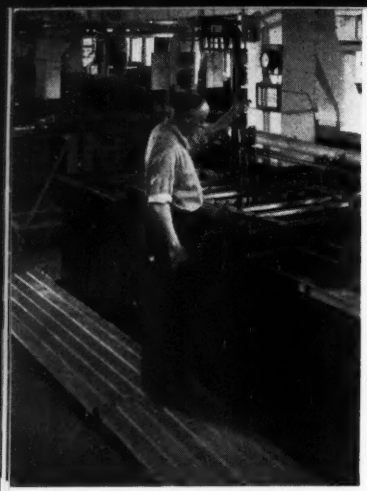
There are 54 Webster Process Steam Traps in use in the Sievering plant.



If you use steam at process pressures let us send you complete information, including tested application data, on Webster Process Steam Traps. Ask for Bulletin 1200D.

By the makers of **Webster** Systems of Steam Heating

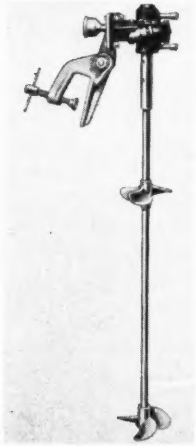
WARREN WEBSTER & Co., Camden, N.J.
Pioneers of Vacuum System of Steam Heating
Representatives in 65 U. S. Cities—Est. 1888



New PLANT EQUIPMENT AND Materials

Binks Propeller Type Agitator

The Binks Manufacturing Co., 3114-40 Carroll Ave., Chicago, Ill., has recently placed on the market a line of Propeller Type air motor drive Agitators for both open and closed type containers. The No. 939 series for open type containers consists of two airplane type propellers, one pitched right and the other pitched left. This method of locating the propellers provides a "throw" towards each other, thus insuring more perfect mixture and the prevention of splashing.



Binks Propeller Type Agitator

Since the agitators are air motor driven, the danger of explosion where inflammable liquids are used is reduced to a minimum. The shafts of the No. 939 series are finished from 12 in. to 27 in. long. Adjustable clamps enable the operator to fasten the agitators to the outside of the barrel in any desired position.

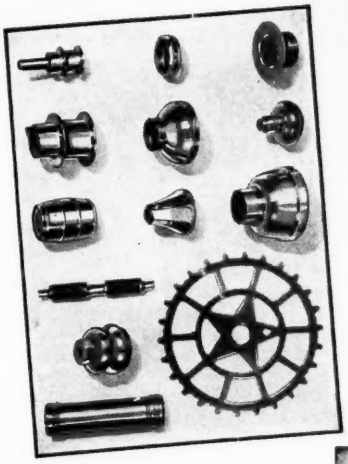
The No. 636 series, consisting of an agitator drive, is recommended for closed type barrels which have their own agitating mechanism. The units are furnished with three adapters for all the usual openings.

Learok

A clean, fast-working composition for use in obtaining high lustre or a mirror finish on various types of metals to be known as "Learok" is manufactured and marketed by The Lea Mfg. Co., 14 Cherry Ave., Waterbury, Conn. A special process developed by this company has resulted in the production of "Learok" buffing and coloring compositions which are said to contain no free grease. This process of manufacture enables the production of a material which contains balanced binders having the property of thoroughly incorporating with the abrasive powders in amounts not excessive but of such a nature and of sufficient quantity to adhere firmly to the wheel and work efficiently.

Having no free grease to transfer back on the work, the use of Learok compositions are said to eliminate the necessity of scrubbing or excessive cleaning. It is produced in cylindrical bars 2¼ in. in diameter by 7 in. long, weighing from 1¾ lbs. to 2¾ lbs., depending upon the grade.

Packer-Matic
Automatic
POLISHING & BUFFING MACHINES



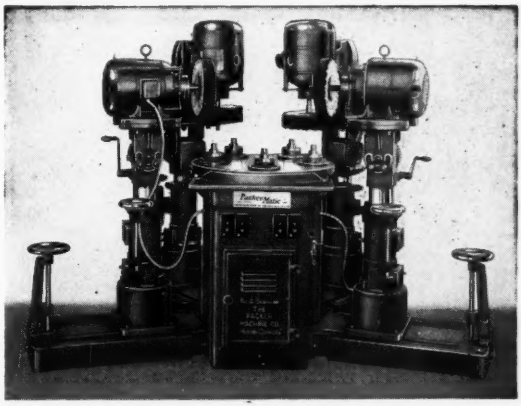
VOLUME FINISHING AT A SAVING » » »

EXAMPLE

PARTS of varied shapes and sizes, in all types of industries are being efficiently and economically Finished on Packer-Matic — the modern method of Automatic Polishing and Buffing.

ROTARY, STRAIGHT LINE CONVEYOR AND ROLL types (Rotary shown at right) are proving their value, daily, in factories where volume Finishing at a Saving in hour costs is imperative.

Send your Part for a "Time Study," Gratis. WRITE "Time Study" Dept.



THE PACKER MACHINE CO. MERIDEN, CONN., U.S.A.

Van Dorn Whirlwind Wire Wheel Brushes

Wire wheel brushes designated as "Whirlwind" have been placed on the market by Van Dorn Electric Tools, Towson, Md. "Whirlwind" wire wheel brushes are available in sizes, thickness, and wire gages to accommodate practically any wire brushing application. The coarse wire is said to be ideal for cleaning castings, removing scale, paint and rust, and other heavy duty cleaning and brushing operations. The fine wire is best adapted for work on aluminum, brass, molds, auto body work, buffing and finishing.

One-section, two-section, and three-section brushes make it easy to adapt brush thicknesses to the job. The variety of sizes, from 4 in. to 12 in. diameter, is said to permit the use of these brushes on all types of grinding, buffing, polishing, and cleaning machines.

Van Dorn Whirlwind Wire Wheel Brushes

"MAGIC" TACK RAGS
IMPROVE YOUR FINISH 100%

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

Wm. A. Juergens Co.
4036-40 Lagrange Street,
Toledo, Ohio, U. S. A.
If your dealer does not carry Magic Tack Rags, write us for sample.

Stripode

An addition agent for speeding up the stripping of nickel deposits and protecting the base metal to be known as "Stripode" has been placed on the market by The Chemical Corp., 93 Broad St., Springfield, Mass. "Stripode," when added to sulphuric acid strip of any concentration, is said to speed up the removal of the nickel plate, and protect the base metal from pitting, roughening, and etching. According to the manufacturer, less acid is consumed, the work is stripped in a minimum of time, and pitting and roughening of the base metal is prevented when "Stripode" is used.

Stripode can be added to the sulphuric strip at a cencentration of ¼ to ½ oz. per gallon. The addition of Stripode causes foaming at first, but is said to decrease after a day's operation.

For stripping nickel from steel and zinc die castings, 60 per cent sulphuric can be used satisfactorily. For stripping nickel from brass, a strength of 70 per cent acid is recommended if the

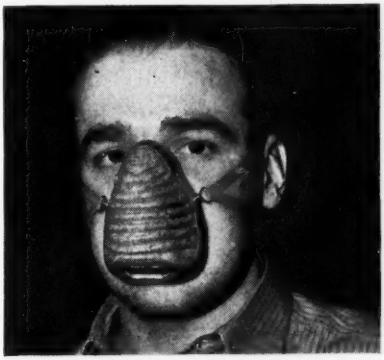
For a real good polishing job use
KEYSTONE EMERY
TURKISH — NAXOS — AMERICAN
KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila, Pa.**

nickel deposit is more than 0.0004; otherwise 60 per cent acid may be used. Six to twelve volts and at least fifty amperes per square foot are required for effective operations of the stripping solution.

A. O. C. Light Weight Respirator

An exceptionally light and efficient respirator designed to protect the respiratory system against dust has been placed on the market by the American Optical Company, Southbridge, Mass. The device has been designated as the A. O. C. Light Weight Respirator. This respirator weighs an ounce and a half and is said to exclude particles as small as a micron (0.025 of an inch) and provides comfortable protection for those working in dust.

The effectiveness of the new respirator, according to the announcement, is due to four improvements: A new method of making the filter unit, resulting in an extremely large, efficient filter area for the size of the mask; a new and efficient exhalation valve; a new, self-equalizing, double headband which holds the device securely but comfortably against the face regardless of the position of the head; and a facial design that enables one to wear the device with perfect comfort.



A. O. C. Light Weight Respirator

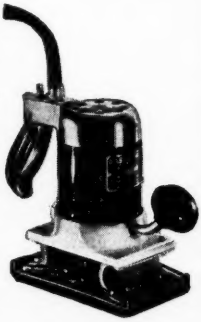
The respirator was designed to weigh the minimum. Heretofore, it has been found extremely difficult to make work-

COSTS GO DOWN when
you grind down welds with
SKILSAW DISC SANDERS
They will save you much time and labor on your toughest weld grinding and cleaning work and leave a smooth, even surface. 3 MODELS for use with grinding wheels, wire brushes, polishing pads, etc. on flat, concave and convex surfaces of metal, wood, stone, marble, tile and composition.
• Sold by leading distributors •
SKILSAW, INC., 4743 WINNEMAC AVE., CHICAGO
36 E. 22nd St., New York; 182 Main St., Buffalo; 52 Brookline Ave., Boston; 15 S. 21st St., Philadelphia; 2124 Main St., Dallas; 918 Union St., New Orleans; 1253 S. Flower St., Los Angeles; 2065 Webster St., Oakland; 29 North Ave., N. W., Atlanta. Canadian Branch: 85 Deloraine Ave., Toronto.

ers wear heavy and uncomfortable respirators, no matter how efficient. As a result, they often expose themselves unnecessarily to dust hazards.

Easy Portable Electric Sander

The 1940 model portable, all-electric sander shown in the accompanying illustration is now being marketed by Detroit Surfacing Machine Company, 7433 W. Davison Ave., Detroit, Mich. This unit is said to be extremely flexible and adaptable to practically any new or maintenance abrasive application. Several of the outstanding features of the model shown in the illustration are as follows: Perfected drive mechanism, increased power, improved positive lubrication and scientific balancing of the entire unit to insure smooth, convenient operation on horizontal or vertical surfaces.



Easy Portable Electric Sander

The easy all-electric, portable tool may be operated from any A.C. or D.C. light socket. Ample power is furnished by a sturdy ball bearing Universal motor which is available in either 110 or 220 volt models. A large fan is provided to assure adequate forced ventilation for cooling. A filter removes injurious dust and grit from the air before entering the motor.

One-third of a standard size sheet of abrasive paper will fit the Easy unit. An improved type of abrasive holder has been developed which holds the abrasive paper tightly on the sanding pad, thus eliminating loss of cutting action when abrasive paper is loose on pad. The Easy Portable Electric Sander is of sturdy construction, designed and built to deliver maximum service under all conditions.

Borolon
TRADE MARK

First quality aluminum oxide **POLISHING GRAIN** abrasive grain manufactured in our own electric furnace plant under strictest standards of quality and uniformity. Available in four types (CT, T, B, TB), each of which is most efficient for polishing work within its field of application. Write for Abrasive Grain Data Sheet No. 1 giving complete details. Samples sent of grain sizes you specify.

ABRASIVE COMPANY
Division of Simonds Saw and Steel Company
Tacony & Fraley Streets · Philadelphia, Pa.
Chicago Branch: 1624 South Western Ave.

DECREASE DEGREASING COSTS!

We can build a "D'OILER" (manual or automatic) to handle your degreasing jobs swiftly and economically. May we send you complete details?

You should use D'OILENE in your degreaser.

MECHANICAL PROCESS CORP.

Specialists in the use and handling of chlorinated solvents

SOUTH ORANGE NEW JERSEY

Paasche High Production Flock Gun

A high production flock gun designated as the Type FF-¾ in. has been placed on the market by Paasche Airbrush Co., 1910 Diversey Pkwy., Chicago, Ill. This flock gun is designed for rapid application of flock when supplied from a flock pressure tank or mechanical feed hopper. The body of the gun is forged brass, nickel plated. The Type FF-¾ in. flock gun has an aluminum alloy pistol grip handle, with an easy operating trigger. When the trigger is fully drawn back, a wide continuous stream of flock is delivered. A slight pull of the trigger releases a blast of clean air, thus enabling the operator to blow off excess flock.

Paasche High Production Flock Gun

The Paasche Type FF-¾ in. flock gun is light in weight and convenient to handle. The unit will not clog, and a constant flow of material is assured. The gun has a ¼ in. standard pipe thread air inlet and a ⅞ in. 27-thread material inlet.

M & W Infra-red Baking Enamels

Two new lines of enamels, especially designed to work at high speed baking schedules in infra-red lamp (radiant heat) ovens, have been announced by Maas & Waldstein Company, 438 Riverside Ave., Newark, New Jersey.

The use of these enamels allows the finisher to take full advantage of the principal features of the infra-red lamp (radiant heat) ovens — that is, more rapid baking, very short warming-up periods, little wasted heat to make the

Watch the *experienced* machinist.

Note how his every motion is unhurried, yet effective . . .

How swiftly his job is done, and how excellently . . .

His services are valuable, for his *experience* lowers costs for the man who employs him.

Because of 120 years of experience, the Hanson-Van Winkle-Munning Company can and does lower costs for those who emp oy its services. When you buy plating and finishing equipment and supplies. or when you have a finishing problem to solve, come to Hanson-Van Winkle-Munning. the headquarters of experience, where this experience takes the place of trial-and-error. Because it costs us less to solve your problem. it will cost you less to have us solve it.

Consider this . . that Hanson-Van Winkle-Munning is not the leader merely because its products are superior but because buyers have found that *our* experience saves *them* money.

Since 1820

HANSON-VAN WINKLE-MUNNING CO.
MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing equipment and supplies

577

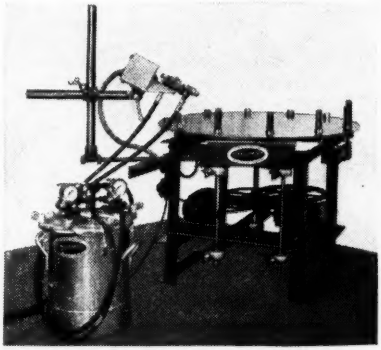
drying room uncomfortable, and a fraction of the floor space needed by fuel-fired ovens. Infra-red lamp baking is especially suited for use with conveyor systems.

The two new lines are "Raydur" Synthetic Baking Enamels and "Raydur" Duart Wrinkle Enamels. With infra-red heat, both will bake to a very hard, durable surface in 15 to 20 minutes and can be handled for assembly half an hour later with little danger of marring. The color retention is good, and the adhesion on various metals and moulded Bakelite is excellent.

Raydur Baking Enamel can be supplied in high gloss and semi-gloss finishes, and Raydur Duart Wrinkle Enamel can be supplied in grades to form fine, medium, and coarse patterns. Both are furnished in black, white and most colors.

Eclipse Automatic Tube Sprayer

The Eclipse Air Brush Company, Inc., 396 Park Ave., Newark, N. J., is now marketing an automatic sprayer which is designed to coat the inside and outside of steel tubes, four inches long and with an inside diameter of one inch. In operation, the tubes are placed



Eclipse Automatic Tube Sprayer

in an upright position on an automatic turntable which rotates them as they pass in front of a solenoid operated spray gun, synchronized with the action of the turntable.

DU-LITE DU-LITE

STEEL COLORING PROCESS

FAST · FOOLPROOF · ECONOMICAL

SEND FOR DESCRIPTIVE LITERATURE

DU-LITE CHEMICAL CORPORATION
Middletown, Connecticut

for
RADIANT ENERGY DRYING
NALCO DRITHERM
(INFRA-RED RAY)
CARBON LAMPS

Cut drying costs . . . Save time . . . Use minimum space . . . Get uniform results
Write for information and prices today.

NORTH AMERICAN ELEC. LAMP CO.
1020 TYLER STREET ST. LOUIS, MO.

Every BUFF Made to Your Order
Deliveries on Schedule
MIDWEST BUFFS
USE MIDWEST
E. 79th ST. & PLATT AVE. CLEVELAND OHIO

A treadle operated spray gun coats the insides of the tubes as they are set into a holder on a stationary table. The setting and removing of the tubes for both inside and outside coatings are manual operations. Production on this work is 1,200 pieces per hour for the outside and an equal number for the inside.

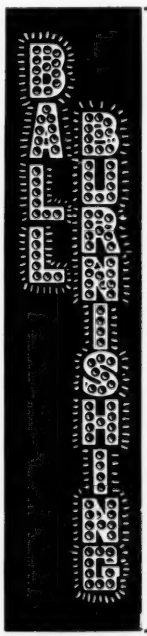
Brush Silver Electroplating Unit

A portable brush electroplating unit for plating silver has been announced by Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago, Ill. A plating compound which enables the unit to plate 0.0002 to 0.001 inch thickness is also available. The brush silver electroplating unit is available in a compact portable kit. Current can be obtained by transformer-rectifier or dry batteries.

Some of the important uses in industrial and maintenance electrical fields include the spot-application of silver to bus bars, screwed or friction connections, high or low voltage circuits, and where reduction of resistance and consequent improvement of conductivity are important. It is claimed that thinner, non-porous platings can be applied by the brush method.

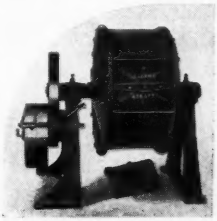
Brush Silver Electroplating Unit

Fundamentally, the brush process does not differ from ordinary commer-



for Better plated surfaces

Prepare for a fine plate first by burnishing small, metal parts. After plating, burnish again. That rolls down the surface, closes pores, increases resistance to corrosion. Pressure does the job. Therein lies the advantage of Abbott high, narrow barrels which take a charge of several hundred pounds of steel burnishing materials. This mobile weight, confined within an upright area, develops maximum pressure on the work. Questions gladly answered. Orders promptly filled.



The Abbott Ball Company

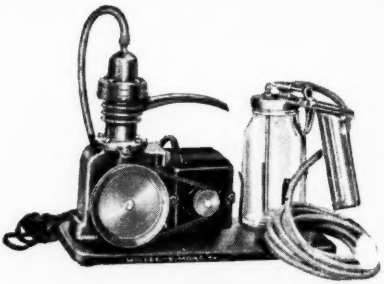
"Burnishing and Cutting-down Barrels—Burnishing Balls and Materials"

1060 NEW BRITAIN AVE. HARTFORD, CONN.

cial plating methods except that the liquid electrolyte is replaced by a highly-concentrated jelly-like compound which, due to its consistency, can be picked up by a specially designed brush and applied to the desired surface.

Miller-Simons Paint Spray Equipment

Miller-Simons, Inc., 2900 South 61st Court, Chicago, Ill.. has announced a line of paint spray equipment which includes spray guns, tank and portable compressor units, and a miniature paint



Miller-Simons Model MS-1300 Paint Spray Unit

spray unit for touch-up work and for miscellaneous service.

The Miller-Simons Compressors are of reciprocal piston type and of conventional design. The units are engineered and manufactured under production methods. The touch-up spray unit which is complete with compressor, motor, spray gun, and hose weighs eight pounds.

Westinghouse Wall and Floor Mounted Air Heaters

A line of wall and floor mounted air heaters, constructed to aid in the solution of heating problems for specific applications, has been announced by Westinghouse Electric & Manufacturing Company, Mansfield, Ohio.

The ease of installation, and clean,

INDIAN BRAND Emery

"INDIAN BRAND" Turkish and Naxos Emery

"HECCO BRAND" American Emery

ABSOLUTE UNIFORMITY
HIGHEST QUALITY
LONGER WEAR
PROMPT DELIVERY
GREATER CAPILLARITY
Write for trial lot.

HAMILTON
EMERY & CORUNDUM CO.
CHESTER • MASS.

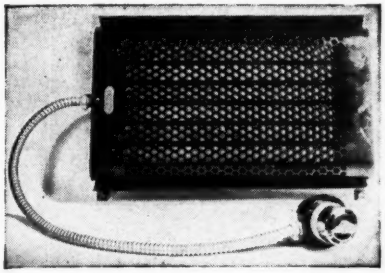
ALUMILITE

Rolled and Cast Aluminum shapes up to 25 feet in length finished by the anodic or alumilite process.

Architectural and aeronautical pieces a specialty. Write:

ALUMINUM FINISHING CORPORATION
1119 EAST 22nd STREET INDIANAPOLIS, IND.

steady, odorless heat are said to make these units particularly desirable for industrial applications. The units are



Westinghouse Wall Mounted Air Heater

designed for use with either a three-heat hand switch or a Westinghouse Type AA thermostat.

The wall mounted air heaters range from 25⅛ to 31¾ inches in length and are from 10⅜ to 16⅞ inches high. They are said to have a rating of 1,000 to 4,500 watts and operate on 115, 230 or 440 volts. The floor mounted air heaters are said to have approximately the same heating surface in inches and the same wattage rating as the wall mounted units, but they are only made to operate at 115 or 230 volts.

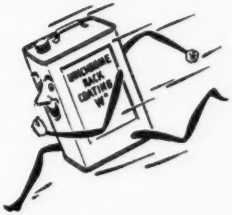
Formulae to determine the proper size heater for individual installations are available.

Aluminum Finishing Service

The Aluminum Finishing Corporation, 1119 East 22nd St., Indianapolis, Ind., is new offering the alumilite or anodic treatment to the manufacturers of aluminum products. The alumilite process is used to produce plain, dyed, or mineral-pigment-colored surfaces. It comprises anodic treatment of aluminum in a suitable electrolyte in order to obtain a dense, adherent coating of aluminum oxide.

One of the outstanding characteristics of alumilite finishes is high resistance to abrasion. This hardness is one of the properties that makes this type of finish particularly adaptable for cafeteria trays, streetcar handrails, automobile pistons, and for numerous other applications where hard surfaces are essential. The value of alumilite fin-

1000
PLATING CYCLES
WITHOUT BREAKDOWN



New, longer-lasting Rack Coating Material

CUTS PLATING COSTS

A prominent metal working plant which ran a test on "Unichrome" Rack Coating-W* advises

"The test rack left with us in January was used at least 1000 times before we took it out of service, because the rack needed repair . . . the coating was still in a serviceable condition (May). Your coating material is the best we have ever tried."

"Unichrome" Rack Coating-W* has the following advantages:

(1) Withstands boiling cleaners and all plating solutions
(2) Tough—withstands wear and tear of handling
(3) Contains no ingredients harmful to plating solutions
(4) Cuts costs—reduces frequency of recoatings
(5) Easy to apply—"dip and force dry" method
(6) Light in color—easy to see how well the rack is covered
(7) Any part of rack can be recoated without entire rack

Write for Bulletin No. 31

Containing complete information

Platers without rack coating facilities may have their racks coated with "Unichrome" Rack Coating-W* by Chromium Corporation of America, 4645 West Chicago Avenue, Chicago, Ill.; Belke Manufacturing Company, 747 Cicero Avenue, Chicago, Ill., or Lea Manufacturing Co., of Waterbury, Conn.

UNITED CHROMIUM
INCORPORATED

51 East 42nd Street
New York, N.Y.

2751 E. Jefferson Ave.
Detroit, Mich.
Waterbury, Conn.

*Trade Mark
Reg. U. S. Pat. Off.

ishes is not confined alone to high resistance to abrasion, they can also be made highly resistant to corrosion. Alumilite finished surfaces are adaptable to aluminum refrigerator trays, and other applications where resistance to the corrosive action of moisture and salt water is desired.

The Aluminum Finishing Corporation will be very glad to supply any additional information.

Divine VCS Polishing and Buffing Lathe

A polishing and buffing lathe designated as the Model VCS has been placed on the market by Divine Brothers Company, 102 Whitesboro St., Utica, N. Y. One of the outstanding features of the Divine V-belt driven lathe is the two bearing construction. The shaft and bearings are of ample proportions to

Divine VCS Buffing and Polishing Lathe

NOW...

S-310

RUST INHIBITIVE

Formulated specifically for the following properties:

1. Very fast air-drying
2. Water-whiteness
3. Tenacious adhesion
4. Hardness combined with flexibility

and

RUST RESISTANCE

S-310

is used and recommended as a clear coating for hand tools, machine tools, hardware and wherever a clear protective coat for bright metal is required.

The Varnish Products Co.
5208 Harvard Ave. Cleveland, Ohio

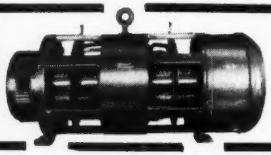
CLEAN, HARD, PAINT-RECEPTIVE ZINC SURFACES OBTAINED WITH

GALVAPREP

Galvaprep removes and neutralizes harmful agents and provides an ideal toothed base for paint. Economical and simple to use. Write for Galvaprep folder.

NEILSON CHEMICAL CO.

6564 Benson St. Detroit, Mich.
1852 E. Slauson St. Los Angeles, Calif.



Write for Latest Catalog on
NEW LOW COST PLATING
with **HOBART** Electroplating Equipment
HOBART BROS. CO., PF-640, Troy, Ohio, U. S. A.

fully sustain the load. The bearings are mounted close to the wheels to give full support to the shaft at the point where the work is done.

The spindles of the Divine Model VCS Polishing and Buffing Lathes are of generous proportions to insure against springing. The threads on the spindles are flat top for longer life and insure against damage when removing or replacing polishing and buffing wheels.

A positive plunger type spindle lock is provided on the Divine V-belt polishing and buffing lathe to hold the spindle stationary when changing wheels. The number and size of V-belts used to drive the spindle is carefully calculated to safely carry the full rated capacity of the lathe, with an ample allowance for overload. The sheaves in which the V-Belts run are of cast iron, accurately machine to proper contour, and balanced.

The Divine Model VCS Polishing and Buffing Lathe is equipped with a heavy wall, one-piece iron base casting which is said to afford a sturdy mounting for the spindle and bearing assembly. All base castings are designed with an overhang for the spindle, to facilitate handling bulky work, or placing automatic work holders in position. The motor of the unit is enclosed in the base for protection against dust and dirt and is easily accessible by removing a tray. Louver doors in the side of base provide ventilation and further access to the motor. A N.E.M.A. standard ball bearing continuous duty open squirrel cage motor is supplied as standard equipment.

Van Dyke No. 518 Lighting Fixture

A completely self-contained lighting unit for strip lighting, to be known as the No. 518, has been placed on the

Van Dyke No. 518 Lighting Fixture

market by Van Dyke Industries, 2900 S. Halsted St., Chicago, Ill. The No. 518

Our Type "K" Bias

---the BUFF that does more work at less cost.

---Ask the users!

Constructed to do fast hard cutting on heavy work. This buff has more polishing surface—note the overlap ply—never wastes compound. Bias formed cloth never ravels nor wastes.

Type "K" Buff—wear considered—costs less than the average buff and does more work. We'll prove it by a trial in your shop.

CAN ALSO BE SUPPLIED WITH THE VENTILATED FEATURE.

The Bias Buff & Wheel Co., Inc.
438 Communipaw Avenue
JERSEY CITY

lighting unit is said to require no special wiring and is supplied with eight feet of rubber cord and plug.

The Van Dyke No. 518 lighting unit can be mounted either on the surface of a ceiling or suspended by means of two loops which are furnished with each strip.

This lighting fixture is recommended for general illumination, as well as inspection and production lines. The No. 518 lighting unit is designed for 18 in., 15 watt bulbs.

SAFETY and COMFORT!

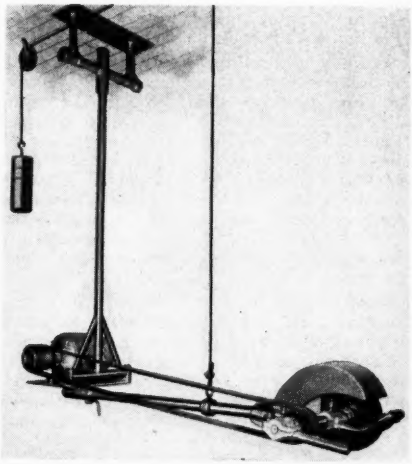
THE Dustfoe RESPIRATOR

U. S. Bureau of Mines-approved for protection against Type "A" dusts—lightweight—compact—with very low breathing resistance, foolproof Army-type exhalation valve, protective filter cover ... *these and many other outstanding features* make the comfortable new aluminum and rubber Dustfoe today's great value in dust protection! Write for complete details in Bulletin No. PF-CM-2.

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas & Meade Sts., Pittsburgh, Pa.
District Representatives in Principal Cities

Jefferson Swing Frame Grinding and Polishing Machine

A swing frame grinding and polishing machine for wheels up to 14 in. in diameter to be known as the "No. 101" has been placed on the market by Jefferson Machine Tool Co., Fourth, Cut-



Jefferson Swing Frame Grinding and Polishing Machine

ter and Sweeney Sts., Cincinnati, Ohio. This machine can be swung forward and backward, up and town, right and left, and at any degree of angle or twist at the spindle head.

The Jefferson No. 101 swing-lathe can be used in finishing departments, plating plants, and all factories where considerable grinding, polishing, and also

UNIFORM DEPOSITS, BETTER FINISHES — USE HARSHAW ANODES AND CHEMICALS
THE HARSHAW CHEMICAL COMPANY
Cleveland, Ohio and Principal Cities

buffing on large workpieces is necessary. The unit is also recommended for use in finishing castings prior to enameling, finishing, and so on.

The weight of the motor of the Jefferson No. 101 swing-lathe and the counter balancing cable and weights are said to make the operation of the machine exceedingly light and easy to handle. This machine is usually swung approximately three feet from the floor, and is especially adapted for work which is large or too unwieldy to be lifted to a wheel mounted on a floor stand. The clearance between the floor and the under side of motor carriage is 3 ft. 9 in. The over-all length is 7 ft. 9 in. and the width is 2 ft. 2 in.

"Lightnin" Model "F" Laboratory Mixer

Illustrated herewith is a laboratory mixer, designated as the Model "F," which has been added to the line of "Lightnin" mixers marketed by the Mixing Equipment Co., Inc., 1038 Garson Ave., Rochester, N. Y. Aside from being portable and easy to handle, the mixer features an adjustable speed friction drive which provides constant horsepower at the propeller and increasing torque with slow speeds. A turn of

"Lightnin" Model "F" Laboratory Mixer

a conveniently located thumbscrew increases the speed up to a maximum of 1,750 r.p.m. or decreases it until the

38 SAMPLES PROVED IT!

New Clear Brass Lacquer No. B10-3

B10-3 was recently tested by three nationally known manufacturers of brass goods. They tested against ours a total of 38 samples submitted by our competitors. THE BRASS LACQUER YOU ARE NOW USING WAS PROBABLY AMONG THOSE TESTED. In each test our lacquer was by far the best. Need we say more?

Send for 5 gals. at the drum price. If it doesn't do what we say return it at our expense for full credit.

C. W. HAYNES LABORATORIES, INC.

SPRINGFIELD • MASSACHUSETTS

Manufacturers of Industrial Finishes, Lacquers, Stains, Varnishes, Synthetics

mixer is scarcely operating. When mounted on a special ring stand clamp, the Model F mixer, it is claimed, can be used on beakers as small as 300 cc without spilling or "throwing out" the contents. The mixer can also be used on tanks up to 20-gal. capacity to produce gentle agitation. A convenient carrying handle enables the unit to be used as a hand mixer without clamp or stand.

Since the motor is totally enclosed, the Model F mixer is recommended for use with inflammable materials. It is widely used in the laboratory for making up standard solutions, stirring constant temperature batch, making up test batches, and so on. The mixer can also be used in mixing small production lots of fine chemicals and similar materials.

According to the manufacturer, the Model F mixer can be operated over a full range of viscosities, producing the same "Lightnin" double mixing action as in full scale operation. In suitable quantities, materials up to 300 centipoises are said to be agitated continuously without overloading the motor. Thicker materials can be handled successfully by reducing the speed slightly by means of a speed control. The Model F is said to give medium agitation in thin liquids up to 5 gal., in medium thick liquids up to 2 gal., and in heavy liquids in 1 to 2-qt. quantities. The mixer is available for 110 or 220 volt, 60 cycle, one phase current.

J-B-T Model 70-PO Potentiometer-Pyrometer

A portable potentiometer - pyrometer for measurement of temperatures by thermocouples to be known as the Model "70-PO" has been announced by J-B-T Instruments, Inc., 441 Chapel St., New Haven, Connecticut.

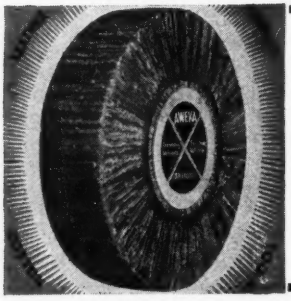
The Model 70-PO has important applications in industrial, laboratory, electrical, and moving vehicle temperature reading. It is also designed for testing permanently installed temperature measuring and controlling equipment. It requires less balancing and less effort to operate than any previous potentiometer.

Model 70-PO has these principal features:

Okey Let's Settle this AT OUR EXPENSE!

Will using a pre-finished metal cut your production costs? Here is an opportunity to find out . . . at our expense. We supply you — without cost or obligation — with enough metal to conduct a conclusive cost comparison test in your own plant, on your own product, according to your own system of accounting. Write for complete information on this offer. This test may be the most important step in your company's history.

AMERICAN NICKELOID COMPANY
Manufacturers of Pre-Finished Metals
SHEETS — COILS — FLAT WIRE
1320 Second Street --- Peru, Illinois



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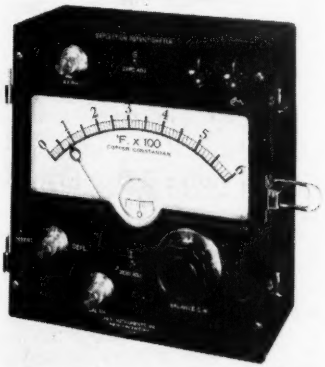
Write for Estimates.
ATLANTIC WEKA CORP.
35 Wooster St., New York, N. Y.
MANUFACTURERS OF AWEKA SPECIALTIES

1. It withstands vibration and adverse conditions of ambient temperature.
2. It is unusually light in weight—less



J-B-T Model 70-90 Potentiometer-Pyrometer

than 5¼ lbs.—truly portable.
3. The instrument uses no standard cell. The unique circuit, for which patent has been applied, requires only a flashlight cell.
4. Temperatures varying at such a rate that total scale is spanned in ten seconds can be readily followed.
5. Guaranteed accuracy is one-half of one per cent scale deflection.

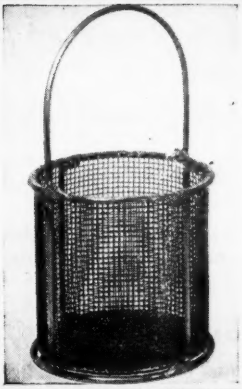
Model 70-PO case is mahogany with lustrous natural finish, 6½ in. x 7½ x 4$\frac{13}{16}$ in.—3$\frac{13}{16}$ in. deep with cover off; has leather carrying handle, cover fitted with slip hinges. Panel is engraved bakelite. Aluminum case for flush switchboard mounting can be supplied on special order.

Available thermocouples, leads, and fixtures include all standard materials and various styles for wide range of everyday uses in industrial plants, utilities, laboratories, aircraft, and automotive test.

Westinghouse Fluorescent Luminaire

A 48-inch, 2-lamp, 40-watt fluorescent luminaire with light spread distribution designed for general or supplementary lighting in low bay industrial areas has

WELDED INDUSTRIAL BASKETS



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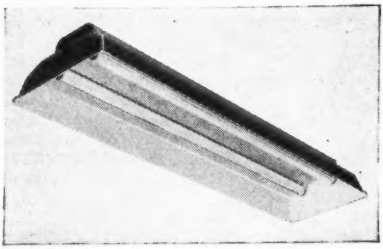
ROLOCK INC. 14 STATION ST. SOUTHPORT, CONN.

been announced by Westinghouse Electric & Mfg. Co., Cleveland, Ohio. The units are furnished wired complete with



Westinghouse Fluorescent Luminaire

hood, reflector, lamp holder, lamp starter and ballast equipment for 110-125, 199-216, or 220-250 volt circuits.

The hood is of sheet-steel hinged to the reflector with knockouts at each end to provide for end-to-end mounting and straight-through wiring. Finish is of smooth silver gray baked enamel. The reflector is white porcelain enameled steel, and has an over-all efficiency of 78 per cent with a cutoff of 72½ degs. from vertical when viewed normal to the lamp.

Units are arranged for rigid conduit, flexible conduit, or chain suspension mounting. When rigid or flexible conduit is used, two ½-in. knockouts are provided on 30-in. centers on the top of the hood. For chain sustention, two closed loops are available.

Patterson Conical Dry Blender

Positive plating action and constant speed are said to be obtainable by means of a dry conical blender which is now being marketed by The Patterson Foundry & Machine Co., East Liverpool, Ohio. The two cones of the unit have a carefully engineered angle, with smooth, flawless interior. The absence of stuffing boxes and internal mechanism provides maximum assurance of quick blending with utmost accuracy.

The circulatory motion obtained as the machine revolves is said to achieve a constantly increasing degree of uniformity, thus producing a homogeneous,

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. . . Modernize Your Plant By Making a Small Investment!

Lupomatic equipment is very inexpensively priced. The process is fully automatic. Equipment costing less than $200.00 produces a job that cannot be duplicated by automatic polishing machines costing from $15,000.00 to $20,000.00.

Progressive manufacturers are now using the LUPOMATIC process to compete and to meet the strict requirements of the trade. LUPOMATIC equipment operates fully twenty-four hours a day.

Save and produce automatically the finest finish at the lowest-cost!

Lupomatic Tumbling Machine Co., Inc.

4510 Bullard Ave. New York, N. Y.
FAirbanks 4-1870

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Though attractively priced, ROBERTS ROUGES and BUFFING COMPOUNDS are unsurpassed in sustained high standard quality and contain no silica or other health menacing ingredients.

Please state your finishing requirements and samples to apply will be promptly sent at no charge.

THE ROBERTS ROUGE CO.

904 Longbrook Ave., Stratford, Conn.

Specialists in manufacturing of gold, sterling, and silver plate rouges; stainless steel, chrome, and crocus compounds.

absolutely uniform product.

The Patterson Conical Dry Blender is speedy, efficient, for plating free-flowing dry materials of reasonably equal density.

West Rubber Polishing Wheel

The West Company, Inc., Philadelphia, Pa., has announced the development of a soft rubber polishing wheel. It is claimed that these wheels combine substantial flexibility with set-up wheel performance. The "built-in" bond is said to eliminate setting up and balancing operations and provide maximum efficiency due to the inherent qualities of the bond. Less than normal pressure is said to produce desired finishes efficiently.

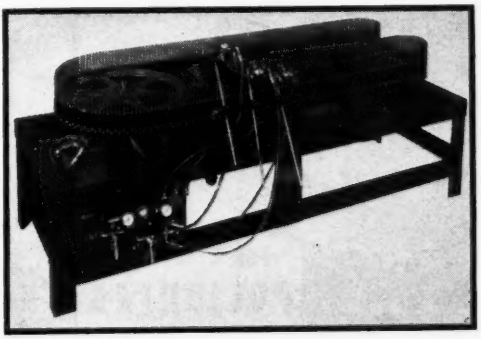
The West soft rubber polishing wheels are easily dressed to any desired shape and are said to hold that shape for the life of the wheel.

Suction Cup Lamp Changer

The Suction Cup Lamp Changer with 4-ft. pole shown in the illustration has been placed on the market by the Suction Cup Lamp Changer Co., 826 Delaware St., Scranton, Pa., for use in removing various sized lamp bulbs from stationary sockets and for installing new bulbs without the use of a ladder or similar equipment. As shown, a suction cup is mounted on the end of a 4-ft. pole and is equipped with a cord which is recessed into a groove running the length of the pole. This cord is used to release the grip of the suction cup after a new lamp has been installed in the socket. The suction cup is designed to grip a large number of

Suction Cup Lamp Changer with 4-Ft. Pole

SPRACO
HIGH-PRODUCTION SPRAY-FINISHING MACHINES



For high-speed spray finishing of all kinds of shell work we design to your specifications completely automatic spray finishing machines. Pictured above is a 408-spindle horizontal chain conveyor type with a production capacity of 60 pieces per minute.
We also manufacture a complete line of spray nozzles for washing and rinsing work in connection with plating operations.

If you have any spraying problems, write to

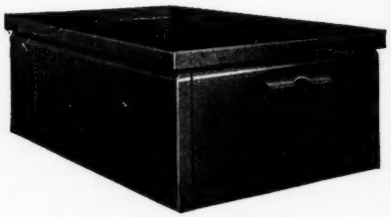
SPRAY ENGINEERING COMPANY
114 CENTRAL STREET SOMERVILLE, MASS.

different sized lamp bulbs and thus eliminates the necessity of having a number of various sized lamp changers.

The standard Suction Cup Lamp Changer can be equipped with either a 4 or 7-ft. wooden pole. An 8-ft. grooved extension pole completely equipped for use with either the 4 or 7-ft. lamp changer to reach lamps located in unusually high places can also be furnished. Where a 10-ft. pole length is desired, an extension can be supplied.

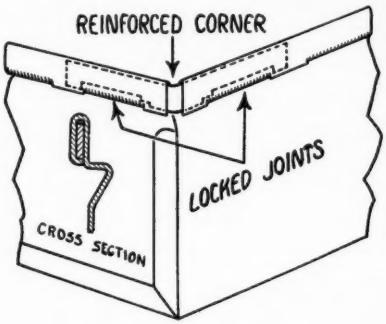
Pollard Stacking Box with Reinforced Corners

The Pollard Stacking Box shown herewith, product of the Pollard Bros. Mfg. Co., 5514 Northwest Highway, Chicago, Ill., is now available with improved type reinforced corners which are said to remain tightly fitted together even under severe use. The construction of the reinforced corners is clearly shown in the drawing. With the use of reinforced corners of this type, the necessity of spot welding angle pieces in the corners of a box is claimed to be entirely eliminated, and it is claimed that boxes thus made will never loosen or come apart.



Pollard Stacking Box with Reinforced Corners

All sizes of Pollard stacking boxes, as well as open end boxes, can now be furnished with reinforced corners. A catalog showing the Pollard line of stacking boxes is now ready for distribution by this company.



Drawing Illustrating Construction of Reinforced Corner

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AA QUALITY ABRASIVES
FOR POLISHING AND BURNISHING
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AMERICAN ABRASIVE COMPANY
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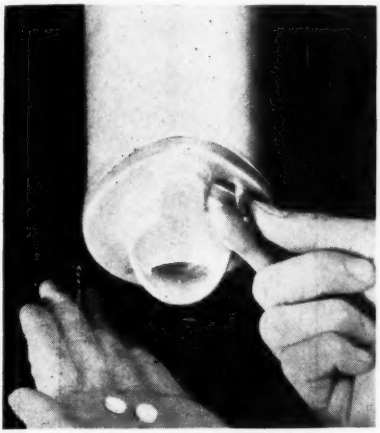
RUST-I-CIDE "50"
Cleans, etches, and prepares metal for a perfect finishing job.
It can help your product.
RUSTICIDE PRODUCTS CO.
3125 Perkins Ave. • Cleveland, Ohio

Milburn Dispens-Eze

A salt tablet dispenser made of aluminum and specially plated, to be known as the "Dispens-Eze" has been announced by the Milburn Co., 905 Henry St., Detroit, Mich. The Dispens-Eze



Milburn Dispens-Eze

salt tablet dispenser has a capacity of more than one thousand ten to fifteen grain salt tablets.

In addition to the mechanical simplicity of this salt dispenser, the unit is said to be heavily constructed, thus reducing maintenance problems to a minimum.

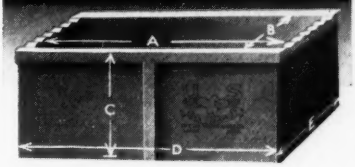
Power-Mix

A laboratory mixer to be known as "Power-Mix" has been placed on the market by Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y. This unit is supplied with a Monel support arm which fits into any clamp and permits the mixer to be adjusted to any angle.

The Power-Mix unit is said to be provided with extra power which enables it to run continuously on heavy fluids such as glues, lacquers, paints, heavy oils, and so on. Full power is developed at the lowest speeds. The speeds may be varied from 0 to 1,350 r.p.m.

According to the manufacturer, the Power-Mix unit cannot be injured by

ACID-PROOF TANKS



Made of "DENSTONE" — an Acid - Proof Chemical Stoneware, dense-bodied and non-porous, and made from De-Aired (Vacuumized) clays.

All tanks are unqualifiedly recommended for electroplating, galvanizing and pickling work. The dense, granite-like body is acid and corrosion-proof all the way through.

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STAINLESS - STEEL PICKLING TANKS

THE U. S. STONEWARE CO.
AKRON, OHIO

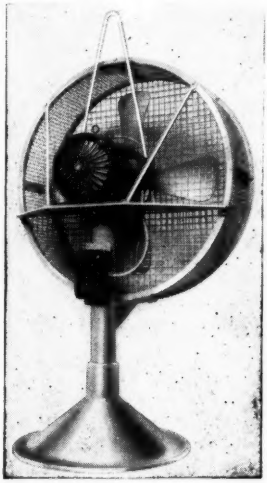
overloading and is explosion-proof. Two shafts (with stuffing boxes), one for high and one for low speeds, are provided. The chuck is adjustable for glass or metal stirring shafts. The unit will operate on either A.C. or D.C.

Portable Cooling Fan

The Truflo Fan Company, 579 Main St., Harmony, Pa., has announced a series of portable cooling fans which are available in sizes ranging from 12 in. to 36 in. in diameter. The accompanying illustration shows a 36-in. cooling fan.

The Truflo portable cooling fan shown here is 48 in. high to the center line of the fan wheel and is equipped with a 32-in. diameter cast iron base and 4-in. pipe stand. A special ¾-in. round steel bar is electrically welded to the motor base and bolted to the top of guard for handling with overhead crane. This fan is equipped with a 3 h.p. motor operating at 60 cycle A.C. at 1,150 r.p.m. The total weight of the stand, guard and propeller, a 4-blade solid cast aluminum wheel, is 356 lbs.

The Truflo portable fans are sturdily constructed for hard usage and are designed so that the flow of air can be directed away from the worker. Drafts



Portable Cooling Fan

are eliminated and cool, comfortable working temperatures are maintained. This is said to result in lower humidities, improved efficiency, and better working conditions.

Cuprodine

A dip solution for copper-coating steel without current to be known as "Cuprodine" has been placed on the market by American Chemical Paint

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ABRASIVE GARNET

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FOR
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NORTH CREEK, WARREN COUNTY, N.Y.

SKYBRYTE
Aluminum Waxes
• For plain or anodic surfaces. For production or maintenance. Beautify and protect all bright surfaces. Write for samples.
THE SKYBRYTE CO.
CLEVELAND, OHIO

Company, Box 303, Ambler, Pa. "Cuprodine" can be used on wire and strip, for masking surfaces before carburizing, and with some success, as a basis for nickel plating.

Cuprodine is a powdered chemical that can be used in the same manner as ordinary copper salts, and is said to produce a dense, adherent, lustrous coating.

The solution consists normally of 3 per cent of 60 deg. or 66 deg. Be. sulphuric acid by volume in water, to which three ounces of Cuprodine have been added for each gallon of solution. The Cuprodine should be added to the acid-and-water mixture after it has reached a temperature of 150 deg. F. This speeds the dissolution of the Cuprodine. With certain types of steel, the solution may run as low as 2 per cent in acid.

The Cuprodine process is said to be quite simple. The surface to be copper-coated is first pickled and rinsed. It is then immersed in the Cuprodine solution until the coating is completed. The time required varies from ten seconds to two minutes, depending upon the nature of the steel and the thickness of the coating desired.

The Cuprodine solution may be used at temperatures of 70 deg. to 150 deg. F., depending upon the metal and the coating desired. When the coating is complete, the surface may be rinsed in either hot water, or in hot dilute alkali, and then dried.

Weka Grinding and Polishing Wheels

Grinding wheels made of the highest grades of materials are being marketed by Atlantic Weka Corp., 35 Wooster St., New York City. The best cotton, wool, and leather obtainable are used in the manufacture of these wheels, depending upon the service into which the wheel is placed.

The following recommendations for the grinding and polishing wheels are suggested: Woolen wheels for dry grinding; cotton wheels for grease grinding; and canvas wheels for rough and solid articles. Leather wheels are recommended where sharp edges are desired and for grease grinding only.

Bonding materials which are used in the application of abrasive to Weka wheels provide maximum adhesion. Weka Grinding and Polishing Wheels

100 GALLONS

OR

486,000 GALLONS

—or any size in between, in any kind of wood tank. Can be lined with lead, rubber, asphaltum, pitch, monel metal, etc. Tell us what size and type of tanks you use and let us show you the advantages of leakproof wood tanks and how our 86 years experience can help you—or write without obligation for our interesting bulletin G.

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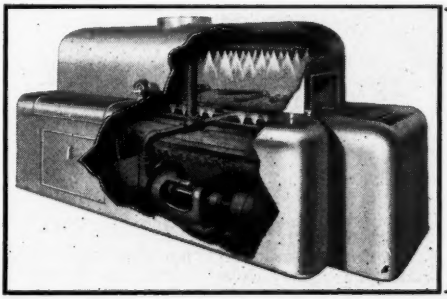
WOOD TANK MFG. CO.
DARBY *Since 1854* PENNA.



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Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles — from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

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International Conveyor & Washer Corp.
640 E. FORT ST. DETROIT, MICH.

are available in a wide range of diameters, widths, and sizes of core holes. The wheels are designed to meet the requirements of practically every grinding and polishing operation.

Bright Copper Solution

A process for obtaining bright copper deposits is described in U. S. Patent No. 2,195,454. This patent is based on an application by Lawrence Greenspan assigned to Louis Weisberg, Inc., 71 West 45th St., New York City. The solution used is not of the familiar acid sulphate or cyanide type generally used for copper plating. Instead, the copper is present in the form of a complex salt formed by interaction of copper sulphate with a suitable amine; certain agents are employed in addition to give brightness and for other purposes.

The term amine is a familiar name applied to certain organic derivatives of ammonia. Many compounds belonging to this family are known and quite a few are commercially available. Attempts have previously been made to utilize amines in copper plating without any particular success. The chief difference between these solutions and the solution described in the patent is in the presence of the addition agents.

When ammonia is added gradually to a solution of copper sulphate, the effect is to produce a precipitate which redissolves when a sufficient excess of ammonia has been added. The behavior of copper sulphate solutions to which an amine is added is similar; the first result is the formation of a precipitate, which dissolves when an excess of amine has been added. The solution then contains a complex copper compound which gives it a deep blue, or sometimes a purplish, color.

Various commercially available amines may be used. An example given in the patent is diethylene triamine. The invention is based on the discovery that good, ductile, bright copper deposits can be obtained from solutions containing complex copper salts formed by interaction with amines, for example, diethylene triamine, providing the solution also contains suitable amounts of ammonium compounds such as ammonia and/or ammonium salts. In general, therefore, the solution may be said to

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BARON STEUBEN
HOTEL

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Theo. De Witt, Pres. **R. F. Marsh, Vice Pres.**

contain copper sulphate, diethylene triamine, and ammonium sulphate, with or without some additional ammonia.

Rolock Wire Mesh Baskets for Industrial use. A 12-page catalog describing and illustrating Rolock wire mesh baskets is now being issued by Rolock Incorporated, Railroad Place, Southport, Conn. Rolock baskets and crates are made for such varied industrial uses as dipping, pickling, degreasing, drying, plating, galvanizing, centrifugal working, and toting. Some of the many types which are manufactured by this company are shown in this catalog.

Every basket is made to order and not one is a stock item. Each is built to fit the customer's particular requirements, thus giving complete satisfaction with maximum life at an economical cost per hour of use. Experience in this field enables this company to help you with intelligent and practical suggestions. Correct design is based on the choice of the proper metal or alloy, type of construction, shape and size of basket, type of handle, size and weight of mesh, number and location of braces, and so on.

A copy of this catalog will be sent free upon request.

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IN PLATING GENERATORS
1500/750 amp. 6/12 volt, 1100 rpm, Z.L.&L.
1000/500 amp. 6/12 volt, 1150 rpm, H.&V.W.
750/375 amp. 6/12 volt H. & V. W.
400/200 amp. 6/12 volt H. & V. W.
300 amp. 3 volt Elec. Prod. vertical motor drive.
200 amp. 7½ volt Hobart, motor drive.
200 amp. 6 volt Electric Products, motor drive.
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Plating generators Bought, Sold, Exchanged. *Write*
THE MOTOR REPAIR & MFG. CO.
1535 Hamilton Ave. Cleveland, Ohio

FOR YOUR *Catalog* LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Dust Control
A complete story of dust control in words and pictures by means of Roto-Clone dust control equipment is now being issued by American Air Filter Company, Inc., 700 Central Ave., Louisville, Ky.

2. Easy Electric Sander
The all-electric portable finishing machine for easy finishing application known as the "Easy" Electric Sander is described in a catalog now being issued by Detroit Surfacing Machine Company, 7433 W. Davison Ave., Detroit, Michigan.

3. Pentrate As a Permanent Product Finish
An attractive four-page catalog describing the Pentrate process of metal-finishing is now being issued by Heatbath Corporation, 242 Westfield Ave., Springfield, Massachusetts.

4. Copper-Coating Steel Without Current
Cuprodine—a granular material used in solution for producing a tight, bright copper plate on steel by a simple immersion process is described in a catalog which is now being issued by American Chemical Paint Company, Dept. 303, Ambler, Pennsylvania.

5. Saginaw Conveyor Equipment
Every type of conveying equipment manufactured by Saginaw Stamping & Tool Co., Saginaw, Mich., is described and illustrated in a 52-page catalog now being issued by this company.

6. Keeping Plating Solutions Clean
A new aproach to the problem of keeping plating solutions clean by means of "Hy-Speed" plating filters is described in a catalog which is now being issued by Alsop Engineering Corporation, Milldale, Connecticut.

7. Better Filtration Means Better Plating
A fully illustrated eight-page catalog explaining how filtration improves plating is now being issued by T. Shriver & Company, 810 Hamilton St., Harrison, New Jersey.

8. Safety Clothing
A handsomely illustrated catalog featuring approved industrial safeguards is now being issued by Industrial Gloves Corporation, 722 Garfield Blvd., Danville, Illinois.

9. Learok Buffing Compound
A bulletin containing notes on the use of Learok, a fast-working buffing compound with no free grease, is now being issued by The Lea Mfg. Co., 14 Cherry Ave., Waterbury, Connecticut.

10. Wire Mesh Baskets
A 12-page catalog illustrating and describing Rolock baskets and crates for dipping, pickling, degreasing, drying, plating, and so on, is now being issued by Rolock Incorporated, Railroad Place, Southport, Connecticut.

11. Drying Problems Made Easy
The manner in which Nalco Dritherm infra-red ray carbon lamps make drying problems easy with radiant energy is described in an eight-page catalog which is now being issued by North American Electric Lamp Company, 1014 Tyler St., St. Louis, Missouri.

12. Weka Grinding and Polishing Wheels
A six-page folder describing and illustrating Weka grinding and polishing wheels is now being issued by Atlantic Weka Corp., 35 Wooster St., New York City.

13. Automatic Polishing and Buffing Machines
A fully illustrated catalog showing installation views and applications of automatic polishing and buffing machines is now being issued by Acme Manufacturing Company, 1643 Howard St., Detroit, Michigan.

14. Fluorescent Industrial Lamps
One of the most complete lines of fluorescent lamps manufactured is described in a catalog which is now being issued by Van Dyke Industries, 2857 S. Halsted St., Chicago, Illinois.

15. Truflo Wall Fans
Four and six-blade propeller type wall fans are featured in a four-page folder now being issued by Truflo Fan Company, Harmony, Pennsylvania.

16. Production Methods Metal Parts Washing Equipment
A beautifully illustrated 6-page folder describing A-F Industrial Washing Machines is now being issued by The Alvey-Ferguson Company, 200 Disney St., Cincinnati, Ohio.

17. Airway Ventilated Buffs
Cool cutting buffs for high speed buffing operations are illustrated and described in a 4-page folder now being distributed by Jackson Buff Corporation, 21-03 41st Ave., Long Island City, New York.

18. Modern Electroplating Control
Modern electroplating control with Sangamo Amperehour Meters is discussed in an 8-page catalog now being issued by Lasalco, Inc., 2822-38 LaSalle St., St. Louis, Missouri.

19. Paper Masking Tape
A masking tape that is highly resistant to lacquers, paints, and solvents is described in this folder now being issued by Industrial Tape Corporation, New Brunswick, New Jersey.

20. Analysis of Plating Solutions
The fifth edition of this booklet describing simple methods of analyzing plating solutions is now being issued by Hanson-Van Winkle - Munning Co., Matawan, New Jersey.

21. Metalprep
A preparation which is said to remove rust, clean metal, destroy rusting agents, assure a bond between paint and metal is described in this folder now being issued by Neilson Chemical Co., 6564 Benson St., Detroit, Michigan.

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